

CROSS REFERENCE

FILE: MORSE, MARSTON (Publications)

RE: Payment of \$1,050 to Journal d'Analyse Mathematique
for publication and reprint charges for article
"Non-degenerate functions on abstract differentiable
manifolds M_n " published in Vol. 19, pages 231-272.

LETTER DATED: June 30, 1967

SEE: Master Publications file

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

June 15, 1967

Dr. Carl Kaysen
Institute for Advanced Study

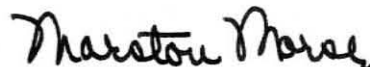
Dear Dr. Kaysen:

I am sorry that my request for Father Blanton to be my assistant next year came to you late. It is very difficult to find a competent assistant early in the year because the most competent young men are at that time applying for National Science Foundation fellowships. They are able to give answers to requests only in April. In the meanwhile, I have to find out which ones are available and learn something of their credentials.

In addition, Father Blanton had to take time to get the consent of his superior before he could declare himself available as my assistant for next year.

I will keep you informed of my intentions another year so that you can adjust the budget correspondingly.

Very truly yours,


Marston Morse

MMcdu

complete correspondence
in Professor Weil's file

May 30, 1967

Dear Marston:

Attached are copies of my correspondence with Albert. I am somewhat perplexed as to his attitude; do you think it will be shared by other members of the profession?

Here is a copy of the appointment letter to Blanton. It is fortunate that he is a Jesuit, as the only housing we are not short on at the moment is bachelor flats.

It would be helpful for planning on budget and housing if it were possible for you to choose an assistant earlier in the year, say by the beginning of April.

Cordially,

Cari Kaysen

Professor Marston Morse
School of Mathematics

Fac Morse

cc Professor Morse
Mr. Morgan
Mrs. Barnett
Miss Underwood

20 September 1966

Dear Mr. Tischler:

I am pleased to inform you that your salary for the academic year 1966-1967 will be increased to \$3,300.

With all good wishes,

Carl Kaysen

Mr. David C. Tischler
The Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

September 8, 1966

Dr. Carl Kaysen, Director
Institute for Advanced Study

Dear Dr. Kaysen:

Mr. David C. Tischler has been invited to be my part-time assistant for the academic year 1966-67 at a salary of \$3,000. I should like to request that his salary be raised to \$3,300 in order to help defray the income tax he will have to pay because he receives a salary.

Very truly yours,

Marston Morse

Marston Morse

MMcdu

9-12-66 Morse

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

June 25, 1965

Mrs. Wilder Hobson
Institute for Advanced Study

Dear Mrs. Hobson:

I have just received an announcement of an honor from France which is sufficiently high to warrant a press release.

I suggest the enclosed press release to the Associated Press, New York papers, and local papers.

As ever,

Marston Morse
Marston Morse

MMcdu
Enclosures

done by CSU

PRESS RELEASE

The French Academy of Sciences on June 21, 1965, elected Marston Morse, Professor Emeritus of Mathematics of the Institute for Advanced Study in Princeton, N. J. "Foreign Associate" of the Academy of Sciences to succeed Dr. Alfred Blalock of Johns Hopkins, the pioneer in this country in heart surgery. There are presently seventeen Foreign Associates of the Academy in the world, of which three are from the United States. Professor Morse has been Correspondent of the Academy since 1956.

Professor Morse is responsible for the introduction of a new branch of mathematics termed "Analysis in the large". It carries on and extends some of the ideas introduced by the great French mathematician Henri Poincaré. This theory is being increasingly applied to equilibrium problems in physics and engineering and promises many more such applications to fields which vary from geometrical optics to celestial mechanics.

Morse recently received the National Medal of Science from President Johnson with the citation:

"For extraordinary achievement in creating analytic theories in the large, for statesmanship in the world of mathematics and for distinguished service to his country in war and peace."

The Institute for Advanced Study
Princeton, New Jersey

June 25, 1965

Morse

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

June 16, 1965

Dr. Robert Oppenheimer
Institute for Advanced Study

Dear Robert:

I was encouraged by Dr. Galbraith, who is the head of the mathematics office of the Army Research Office, DURHAM, to ask the Institute to make an application for me for three years starting July 1966.

The proposal is enclosed. I hope you will approve of it and send it in.

Sincerely yours,

Marston Morse

Marston Morse

MMcdu
Enclosure

*No signed
returned to CDU
6/21*

Morse

cc: AROD, 2 cc
Mrs. Hobson
Mr. Morgan
Prof. Morse

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY 08540

SCHOOL OF MATHEMATICS

June 16, 1965

Commanding Officer
U. S. Army Research Office, DURHAM
Box CM, Duke Station
Durham, North Carolina

SUBJECT: Proposal for Basic Research Support

Dear Sir:

The Institute for Advanced Study hereby makes an application for a grant from the U. S. Army Research Office, DURHAM, for Global Differential Analysis and Topology, the period of the grant to be from July 1, 1966 to June 30, 1969. The Chief Investigator will be Professor Marston Morse. The amount requested is a total of \$43,200 for the three-year period.

I. Satellites. The control of satellites intended to have long-term existence would be simplified if the orbit were nearly periodic. This is implied in a treatise written by one of those scientists presently concerned with such control.

Morse plans to verify his conjecture that in the restricted problem of three bodies, as defined by Poincaré, there always exists at least one retrograde periodic orbit of the infinitesimal body for any value μ of the ratio of the masses of the two principal bodies. The mode of proof will be new and will seek to minimize the J-height of the highest periodic curve in a suitably chosen relative 1-cycle of periodic curves. Here J is a modified form of the Jacobi Least Action Integral. Once this problem is solved a similar attack will be made on direct orbits both in 3-body and n-body problems.

II. The Riemann conformal map of the interior of a simple plane closed curve g onto a circular disc, varies continuously with g , as g varies continuously in the sense of Fréchet, provided the images on $Bd D$ of three distinct points on g are continuously prescribed and distinct. No strict generalization of this theorem in n-space, $n > 2$ exists. However, Morse intends to establish the following theorem which in some respects is stronger.

Theorem. Let E be a euclidean n-space, S an (n-1)-sphere in E and z an arbitrary point on S .

Commanding Officer
U. S. Army Research Office, DURHAM

June 16, 1965

A real analytic diffeomorphism f of S into E admits an extension F as a homeomorphism of E onto E such that the restriction of F to $E - z$ is a real analytic diffeomorphism of $E - z$ onto $E - f(z)$ with F "regular" at the point at infinity in E , in the sense of the geometry of inversion.

If $f = f^p$ varies continuously with a parameter p on a compact set Γ , an extension $F = F^p$ of f^p of the above nature exists for each $p \in \Gamma$, such that the mapping

$$(x,p) \longrightarrow F^p(x) \qquad (x,p) \in (E \times \Gamma) .$$

is continuous.

For $n = 2$ this theorem is not a consequence of the conformal mapping theorem. The regularity of the mapping at infinity calls for methods much beyond those already used by Morse and Huebsch; the dependence on the parameter likewise. The theorem requires preliminary theorems on diffeomorphisms which are not analytic. A theorem also exists in which Γ is not compact. Extensions will be given in which Γ is a regular, real, analytic manifold and $F^p|(E - z)$ is real analytic for (x,p) in $(E - z) \times \Gamma$.

III. Bowls. Let f be a non-degenerate function of class C''' on an orientable, compact differentiable manifold M_n of class C''' . In a series of recent papers, commencing with a paper in the forthcoming book in honor of Morse on "Differentiable and Combinatorial Manifolds", Princeton Mathematical Series, Morse has developed a theory of bowls ascending and descending from the critical points of f . These bowls are the union of the orthogonal trajectories of f emanating from the critical points of f .

Morse intends to apply this theory of bowls to the problem of determining the classes of manifolds M_n diffeomorphic to each other. Particular attention will be paid to 3-dimensional manifolds and the corresponding problem of Poincaré. The paper of Morse and Cantwell in the appended list has been accepted by TOPOLOGY and is a first application. It is possible that a differential approach to these problems will yield results not yet found by those employing a combinatorial approach. It is also possible that the classical topological invariants are inadequate for the desired classifications, and that supplementary invariants can be introduced in terms of the intersections of ascending and descending bowls, and non-degenerate functions possessing the minimum number of critical points of a given index.

Collaboration with Cantwell may be continued on some of these problems.

IV. Schoenflies problems. It has not been adequately recognized how different global problems are when posed in

- (1) topological terms
- (2) differential terms

Commanding Officer
U. S. Army Research Office, DURHAM

- 3 -

June 16, 1965

- (3) analytic terms
- (4) combinatorial terms.

It is possible that the combinatorial Schoenflies problem admits no solution in general. Regardless of this, Morse has this spring defined combinatorial isotopies and in such terms established necessary and sufficient condition that an isomorphism of the boundary of a sub-divided n -simplex onto a combinatorial n -sphere S_n in E_{n+1} , admit the desired combinatorial extension. This is an analogue of a similar theorem established in the differential case by Morse. See [4]. That the conditions of the combinatorial theorem cannot be reduced is the objective of studies being jointly pursued by S. S. Cairns and Morse. Morse and Cairns will continue these studies.

In general the belief of a few years ago that the relations between topology and analysis are along a one-way street from topology to analysis, is now known to be unfounded. Morse's research aims at exploring the reciprocal relations between topology and analysis. Global studies varying from geometrical optics to quantum mechanics depend on such reciprocal relations. A topological and variational theory of quantum mechanics which interprets and extends the group theory approach to quantum mechanics is possible. In its perturbation theory it will go beyond the group theory. All analogies tell me this.

The Institute for Advanced Study is a corporation, not for profit, incorporated in the State of New Jersey.

Budget: (July 1, 1966 to June 30, 1969)

Salary for Professor Marston Morse at \$12,000 a year	\$36,000
Overhead (20 percent of salary)	<u>7,200</u>
Total	\$43,200

CHIEF INVESTIGATOR:

Marston Morse, Professor Emeritus

CONTRACT NEGOTIATOR:

Minot C. Morgan, Jr., General Manager

APPROVED FOR THE
INSTITUTE FOR ADVANCED STUDY:

Robert Oppenheimer, Director

SOME RECENT PAPERS OF MARSTON MORSE, 1962-1965

I. Extensions

- [1] An arbitrarily small analytic mapping into R_n of a proper, regular, analytic r -manifold in E_m , Ist. Lombardo Accad. Sci. Lett. Rend. A, 97 (1963), 650-660.
- [2] (With W. Huebsch) Schoenflies extensions without interior differential singularities, Annals of Math. 76 (1962), 18-54.
- [3] Schoenflies problems, Fund. Math. 50 (1962), 319-332.
- [4] Schoenflies extensions and differentiable isotopies, J. Math. Pures et Appl. 42 (1963), 29-41.
- [5] (With W. Huebsch) Diffeomorphisms of manifolds, Rend. Circ. Mat. Palermo, 11 (1962), 1-28.
- [6] Harmonic extensions, Monatsh. f. Math. 67 (1963), 317-325.

II. Bowls

- [7] Bowls of a non-degenerate function on a compact differentiable manifold, Differentiable and Combinatorial Manifolds, Princeton Math. Series, 1964, Princeton University Press. To appear.
- [8] (With W. Huebsch) Conditioned differentiable isotopies, Bombay Colloquium on Differential Analysis (1964), 1-25.
- [9] The elimination of critical points of a non-degenerate function on a differentiable manifold, Jour. d'Analyse Math. 13 (1964), 257-316.
- [10] (With W. Huebsch) A model non-degenerate function.
- [11] Quadratic forms Θ and Θ -fibre-bundles, Annals of Math. 81 (1965), 303-340.
- [12] (With J. Cantwell) Diffeomorphism inducing automorphisms of $\pi_1(T_p)$.
To be published by TOPOLOGY.

PRESS RELEASE

Marston Morse, Professor of Mathematics at the Institute for Advanced Study, received an honorary degree of doctor of science at Harvard University at Commencement Exercises on Thursday, June 17. The citation read as follows: "An original thinker of influence and power, whose contribution to pure theory has notably extended the reaches of mathematics."

Among the other recipients of honorary degrees were The Honorable Adlai E. Stevenson, U. S. Ambassador to the United Nations, Romulo Betancourt, former President of Venezuela, and Elbert Parr Tuttle, Chief Judge of the United States Court of Appeals, 5th Judicial Circuit, Atlanta, Georgia.

Princeton, New Jersey
June 18, 1965

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

December 1, 1964

Dr. Robert G. Pohrer
Acting Director of Mathematical Sciences
Air Force Office of Scientific Research
Washington, D. C. 20333

Dear Pohrer:

I have your letter of 27 November which does not seem to be an answer to my letter of November 17.

In your letter of 27 November you outline some of the conditions under which you make grants. Are these the only conditions under which you support academic research in this country, and what do these conditions mean where a mathematician is retired? Does 1/3 of a mathematician's academic-year salary mean 1/3 of his last salary before retirement? And what does an academic "leave of absence" mean in the case of a retired scientist?

I would appreciate an answer to these questions and an explanation of the terms.

Very truly yours,

Marston Morse

MMcdu

CC: Dr. M. M. Andrew
Dr. Leon Cohen
Dr. Walter Leighton
✓ Dr. R. Oppenheimer

cc: W. Leighton
✓ R. Oppenheimer

C
O
P
U

Headquarters
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
Office of Aerospace Research
United States Air Force
Washington, D.C. 20333

27 November 1964

Professor Marston Morse
The Institute for Advanced Study
School of Mathematics
Princeton, New Jersey

Dear Professor Morse:

Thank you for your letter of 17 November.

As I mentioned on the night of your lecture at the University of Maryland, 12 November, and as I wish to repeat here, the Mathematics Division cannot encourage you to submit a proposal for the extension of your current research program beyond its expiration date of 30 June 66. Should you choose to submit such a proposal to extend that program, it would probably not be funded.

As you are aware from your intimate association with the Division's program over the years, our budget has remained relatively constant since Fiscal Year 1958. Our present program (Fiscal Year 1965 and beyond) supports up to 1/3 of a mathematician's academic-year, nine-month salary for summer-time research; in addition we have a special sabbatical program (now termed an intensified research program) which provides up to 1/2 of the academic-year, nine-month salary, when the mathematician has an academic-year "leave of absence". If appropriate, you may choose to submit a research proposal under either of these arrangements.

Our concern is to continue a viable basic research program in mathematics in areas of potential Air Force interest, in the face of a constant budget and rising research costs. Our program and our decisions are dominated by this concern.

Sincerely yours,

/s/ Bob Pohrer

ROBERT G. POHRER
Acting Director of
Mathematical Sciences

Fac Morse

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

November 17, 1964

Dr. R. G. Pohrer, Chief
Mathematics Division
Air Force Office of Scientific Research
Washington 25, D. C.

Dear Pohrer:

I was more than surprised by your answer to my question after my lecture in Washington on Thursday. Your answer may be an interpretation of rulings from above. I am as much disturbed by the general principle enunciated as I am by what I regard as an erroneous application of the principle to my case.

What I asked was whether it was appropriate for the Institute to make an application to renew the present contract affecting my research when this contract expires in the summer of 1966. Your answer was that such a renewal was impossible because of the principle that there will be in the future no full time support of academic scientists, except in the case of a sabbatical year.

This means that scientists who have been retired from teaching in their universities are ineligible for research grants from the AFOSR. Or does it mean that they are ineligible unless they obtain part time teaching positions?

I am in sympathy with the obvious intent to make more scientists available for teaching. This rule ought not, however, to apply to those retired from teaching provided they can do important research in science.

In my own case I do not take it that my research is in question. I have produced six or more papers during the last year, all of which have been accepted for publication and some of which are as good as any I have ever written. During the last year there have also appeared several papers by eminent mathematicians with my name in the title. These men include Smale, Palais, Leighton, and others, both in Europe and in this country. I do not believe that this is the issue.

If the issue is general aid in developing the scientific life of the country, as it should be, then it should not be based on so narrow a basis as pay for teaching. I am aiding in general scientific education in the

Dr. R. G. Pohrer

- 2 -

November 17, 1964

following ways:

(1) I am collaborating at the present moment with three mathematicians: William Huebsch, Professor of Mathematics at Western Reserve University; John Cantwell, Professor of Mathematics at the State University of Iowa; and Stewart Scott Cairns, Professor of Mathematics at the University of Illinois. Both Huebsch and Cairns have students working on thesis problems which arose only out of my collaboration with them. In the case of Cairns, I have taken into consideration the fact that he has a large number of doctorate candidates waiting on him. For this reason during the last two months I have completed without any reference to him a definition of combinatorial isotopies and have shown that for a solution of the Combinatorial Schoenflies Problem, such combinatorial isotopies are necessary and sufficient. This is a completely novel result in a field of great difficulty. I shall send it to him because, with his specialist knowledge of the field, I am certain he can make significant additions and applications and stimulate his students. I consciously teach by collaboration. Is such teaching ruled out if it is verifiable? Or must it be paid for?

(2) In addition, I have lectured at six different universities during the last year to teachers and graduate students.

(3) I spent a week at the Wellesley conference on writing mathematical texts for Negro students, so as to give them novelty and power. It was backed by the Educational Services Incorporated and headed by the Chairman of the Physics Department at Howard University.

(4) At the Institute for Advanced Study I have had extensive conversations about their research with men such as Klingenberg, whose research depends definitely on mine.

(5) I am lecturing at the Collège de France and in Rennes during May of 1965. This will be teaching.

It is also relevant to say that when I asked for \$12,000 a year, which was about one-half my last salary, I considered that I was asking for part time aid in research in a total program that would involve these other efforts to develop science.

Can you answer the following question?

While making the ability to produce significant research in science the principal criterion for support from the AFOSR, can you not properly and wisely replace the relatively narrow requirement on academicians that they teach for pay part time, by the requirement that they aid scientific education in other tangible and provable ways?

Your answer will be of importance not only to me but to many others. I hope to have an early answer.

Very truly yours,

MMcdu

Marston Morse

Dr. R. G. Pohrer

- 3 -

November 17, 1964

CC: Dr. M. M. Andrew, Directorate of Mathematical Sciences, AFOSR
Dr. Leon Cohen, University of Maryland
Dr. Walter Leighton, Western Reserve University
✓ Dr. R. Oppenheimer, Director, Institute for Advanced Study

Fac Morse

GR Fac Goldman

10 September 1964

Dear Mrs. Villard:

On July 17, we submitted the Delegate's Acceptance Card with Miss Hetty Goldman's name listed as the Institute's delegate to Alan Simpson's inauguration on October 16th. Due to unexpected developments, Miss Goldman will not be able to attend; however, Professor Marston Morse has agreed to go in Miss Goldman's stead. Tickets and instructions may be sent to Professor Morse at this address or to his home at 40 Battle Road, Princeton.

We hope that this change will not cause the Inauguration Committee too much inconvenience.

Sincerely yours,

(Mrs. J.R. Haymes, Jr.)
Office of the Director

Mrs. Henry A. Villard
Chairman, Inauguration Committee
Vassar College
Poughkeepsie, New York

10 September 1964

Dear Professor Morse:

Dr. Oppenheimer will be pleased to learn that you have consented to be the Institute's delegate at the inauguration of Alan Simpson as president of Vassar on Friday, October 16th.

For your information, I am enclosing a copy of the invitation and a card, which will give you a better idea of the arrangements. I shall write to Vassar today informing them of the change in delegate and asking that they contact you regarding tickets and further instructions.

With good wishes,

(Mrs. J.R. Haymes, Jr.)
Office of the Director

Enclosures

Professor Marston Morse
The Institute for Advanced Study

Gray Rafters
Keene Valley
New York

July 14/64

Dear Verwo; -

Please tell Dr. Oppenheimer
that I shall be both pleased and
willing to represent the Institute at
at the inauguration of the president of
Vassar on October 16th.

I know little about such ceremonies,
but hope for a positive role.

Cordially,

Wally Hedman

9 July 1964

Dear Miss Goldman:

Dr. Oppenheimer, who is in the Virgin Islands, asked me to ask you whether you would be pleased, or willing, to be the Institute's delegate at the inauguration of Alan Simpson as president of Vassar on Friday, October 16th. I am sorry to bother you with this when you are on vacation, but they ask for an answer by August 1st.

With good wishes,

(Mrs. Wilder Hobson)
Secretary to the Director

Miss Hetty Goldman
Keene Valley
New York

*if not ask Morse
if neither, don't bother*

VASSAR COLLEGE

The Inauguration Committee hopes that the President will find it possible to represent his institution in person. If the President cannot participate, the Committee would appreciate his appointing the Dean, a senior member of the faculty, or a member of the Board of Trustees as delegate.

Please list the name of the representative, whether president or delegate, on the Delegate's Acceptance Card, so that tickets and instructions may be sent to the proper person. Luncheon will be served to all delegates and their wives or husbands accompanying them.

Participants in the academic procession are asked to provide their own academic attire.



The Board of Trustees and the Faculty
of
Vassar College
request the honor of your presence at
the Inauguration of
Alan Simpson
as President of Vassar College
Friday, October sixteenth
nineteen hundred and sixty-four
at two-thirty o'clock
and at the reception in Main Parlors
following the Inauguration Ceremony

The favor of a reply is requested
by August the first

*sent card with Miss
Goldman's name
etc. 7/17/64*

cc: Mr. Morgan
Mrs. Barnett
Miss Underwood
Professor Morse

June 2, 1964

Dear Mr. Grossman:

On the recommendation of Professor Morse, I am pleased formally to offer you an appointment in the School of Mathematics of the Institute for Advanced Study, as assistant to Professor Morse for the academic year 1964-1965. We can make available to you a salary of \$6,800 for the year.

With best wishes,

Sincerely,

Robert Oppenheimer

Mr. Nathaniel Grossman
Institute of Technology
University of Minnesota
Minneapolis, Minnesota

March 24, 1964

Dear Mrs. Villard:

This will acknowledge with thanks your note
of March 20, which Dr. Oppenheimer will see on
his return.

Sincerely,

(Mrs. Wilder Hobson)
Secretary to the Director

Mrs. Henry A. Villard
Chairman, Inauguration Committee
Vassar College
Poughkeepsie, New York

VASSAR COLLEGE
POUGHKEEPSIE · NEW YORK
Board of Trustees

March 20, 1964

Dr. Robert Oppenheimer
Director
The Institute for Advanced Study
Princeton, New Jersey

My dear Dr. Oppenheimer:

The trustees and faculty of Vassar College very much hope that you will do us the honor of attending the inauguration of our new President, Alan Simpson on Friday, October 16th, 1964. The formal invitation will be mailed in May but we felt it would be helpful to you in planning your fall schedule to know this date in advance.

I look forward to having you with us at this inaugural celebration.

Sincerely yours,

Mary St. John Villard

Mrs. Henry A. Villard
Chairman, Inauguration Committee

Fac Morse

February 7, 1964

Dear Mr. Feldzamen:

Mr. Morgan has sent along to this office your letter of January 29. In connection with the film that you are making about Professor Morse, the Institute would have no objection to your shooting exterior footage, or to your taking pictures in offices, providing you have the permission of the man whose office it is.

We have a rule against taking pictures in our public rooms (cafeteria, common room, library, etc.) as this has sometimes proved bothersome to members who are using the rooms.

We hope that within this set of limitations you will be able to get the footage you want.

Sincerely,

(Mrs. Wilder Hobson)
Secretary to the Director

Mr. A. N. Feldzamen
Executive Director
Committee on Educational Media
P. O. Box 2310
San Francisco, California
94126

cc: Prof. Montgomery

**Committee
on
Educational
Media**

**Mathematical
Association
of
America**

CEM Central Office
P. O. Box 2310
San Francisco
California 94126

(415) DOuglas 2-7582

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University of Maryland

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Case Institute of Technology
Project Director

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Carleton College

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University of California, Berkeley

R. A. Rosenbaum
Wesleyan University

Marshall H. Stone
University of Chicago

R. H. Bing
University of Wisconsin
President, Mathematical
Association of America
Ex Officio

A. N. Feldzamen
(University of Wisconsin)
Executive Director

January 29, 1964

Mr. Minot Morgan
Institute for Advanced Studies
Princeton, New Jersey

Dear Mr. Morgan:

As part of its projected program in film production, the Panel on Individual Lectures of the Committee on Educational Media of the Mathematical Association of America, is making arrangements for a film to be devoted to the life and achievements of Professor Marston Morse.

His long association with the Institute for Advanced Studies leads us to wish to include certain information about the Institute, and motion picture footage of the buildings and grounds, in this film.

I am writing at the suggestion of Professor Montgomery, to inquire whether the Institute will grant permission for us to shoot exterior footage of the buildings and grounds, and some interior footage of the offices, etc? This filming will, hopefully, take place in mid-spring.

Very truly yours,

A. N. Feldzamen
Per Patricia M. Tutman

A. N. Feldzamen
Executive Director

ANF/pp

Elected Corresponding Member, Polish Academy of
Sciences, 1963

Elected Corresponding Member, Academy of the Rumanian
People's Republic, 1965

Awarded National Medal of Science by President Johnson
1964 (presented at White House, Feb. 8, 1965)

Fulbright Lecturer in Mathematics at the University of
Rennes, May 1965

THE INSTITUTE FOR ADVANCED STUDY

Historical Studies - Social Science Library

ITEMS REMOVED : MORSE, MARSTON - PROF. MATH. 1947-62

1) "An Archive for American Mathematicians," The Mathematical Intelligencer, vol. I, No. 3, 1978.

2) "Harold Calvin, Marston Morse 1892-1977,"
Anniversaires, Portraits, et Oeuvres, The Mathematical Intelligencer, vol. I, No. 1, 1978.

3) Letters to the Editors, The Mathematical Intelligencer, Vol. I, No. 1, 1978.

4) "Professor Named : Marston Morse," The Princeton Packet, June 14 1956.

5) "Professor Morse Elected To Post," The Princeton Packet, August 1, 1963.

6) "Will Bless \$1, 500,000 Science Building,"
Brooklyn Tablet, February 21, 1948.

6)

7) Marston Morse Current Biography, Who's Who and Why, Vol. 18. No. 3, March 1957.

Fac Morse

CC: 15 AFOSR
✓ 1 Mrs. Hobson
1 Mr. Morgan
1 Prof. Morse

PROPOSAL FOR THREE-YEAR GRANT FROM
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
SUBMITTED BY THE INSTITUTE FOR ADVANCED STUDY, PRINCETON, NEW JERSEY

The bidder represents that he has not employed or retained a company or person (other than a full-time employee) to solicit or secure this grant, and agrees to furnish information thereto as requested by the Air Force Office of Scientific Research.

Estimated budget, July 1, 1963 to June 30, 1966:

Salary for Professor Marston Morse at \$12,000 a year	\$36,000.00
Overhead (25 percent of salary)	<u>9,000.00</u>
	\$45,000.00

APPROVED FOR
THE INSTITUTE FOR ADVANCED STUDY:

Robert Oppenheimer, Director

Date March 30, 1962

PROGRAM OF MARSTON MORSE FOR YEARS JULY 1, 1963 TO JUNE 30, 1966.

The title of the program is "Analysis in the Large". The program is an extension of the program accepted by the AFOSR for the year July 1, 1962 to June 30, 1963.

The program for the year 1962-63 was presented under (a), (b), and (c) given below:

In differential topology "the program would start with a proof of the following very general theorem.

"Theorem 1. Let E be a euclidean n -space, S an $(n-1)$ -sphere in E and z an arbitrary point on S .

"A real analytic diffeomorphism f of S into E admits an extension F as a homeomorphism of E onto E , such that the restriction of F to $E - z$ is a real analytic diffeomorphism of $E - z$ onto $E - z$, and such that F is analytic and regular at the 'point at infinity' in the sense of the geometry of inversion.

"(a) Other theorems, to be presented, will show how general such extensions are, how they may be varied, and the general nature of the singularity at z (if any). Extensions F will be shown to exist, carrying a finite number of prescribed points not on S into a finite number of prescribed points not on $f(S)$, provided this prescription is consistent with F being a homeomorphism of E onto E extending f . New methods must be introduced to obtain these results.

"(b) In Differential Topology proper Morse's papers numbers 8 and 9 are preliminary to a theory to be introduced on the classification of compact differential manifolds M (with a Riemannian metric). The elements are the critical points of a non-degenerate function F on M , together with a subset A of the trajectories orthogonal on M to the level manifolds of F . This subset A is the set of orthogonal trajectories which emanate from the critical points of F . The functions F will be 'reduced' in the spirit of reference 8. The end result will be new theorems on diffeomorphisms between manifolds, involving in certain cases, singularities dependent on F and A .

"This work will connect up with paper 4 on 'differential isotopies'. In paper 4 Morse gives a necessary and sufficient condition that a sense-preserving C^∞ -diffeomorphism of S into E be differentiably extendable as a diffeomorphism of E onto E without singularity. A previous important theorem of Milnor gives a sufficient condition in the special case that f maps S onto S . No necessary condition is given by Milnor nor any theorem when f maps S into E (not S).

"(c) Morse plans also to verify his conjecture that in the restricted problem of three bodies, as defined by Poincaré, there always exists at least one retrograde periodic orbit of the infinitesimal body. The mode of proof will be one that is new and depends on minimizing the J -height of a highest periodic curve in a suitably chosen, relative 1-cycle of periodic curves. Here J is the modified form of the Jacobi Least Action Integral, as defined by Birkhoff. A proof of this theorem will undoubtedly throw light on the baffling problem of the existence of direct periodic orbits in the restricted problem of three bodies."

Papers 1 to 9 in the list at the end of this proposal give a background for (a), (b), and (c). Preparation for the year's work on (a) and (b) has been started and is progressing as expected. To this end, papers 4a and 5a have been published and paper 6a, of about 40 pages, will presently appear in the ANNALS OF MATHEMATICS. Paper 6a contains the following theorem:

Theorem 2. Let S_n be a euclidean n -sphere and S_{n-1} an $(n-1)$ -sphere on S_n , $n > 1$. Corresponding to an arbitrary point $Q \in S_{n-1}$ and an analytic diffeomorphism h of S_{n-1} into S_n there exists a homeomorphism H of S_n onto S_n which extends h , and is such that $H|(S_n - Q)$ is an analytic diffeomorphism.

The program for 1963-66 is continued as follows.

Extending (a). Theorem 2, coupled with the results to be proved in (a), will give Theorem 1. The results to be established in (a) require new methods. One applies the Brouwer fixed point theorem in a new way to a continuous family of diffeomorphisms. A special value of the parameter of the family is chosen by means of the Brouwer theorem and leads to the desired results.

The method of obtaining analytic diffeomorphisms extending prescribed analytic boundary diffeomorphisms starts with C^∞ -diffeomorphisms extending these boundary diffeomorphisms. A general theory "on approximating C^∞ -diffeomorphisms by analytic diffeomorphisms" is being developed, both on open euclidean sets and on open differentiable manifolds. The theory will bifurcate according as the boundary conditions permit a C^∞ -extension without singularity (Case I), or require a point singularity (Case II). In Case I the analytic approximation perturbs the boundary values. These boundary values are then restored by infinitesimal analytic diffeomorphisms whose existence is established by the aid of paper 7.

A theory of diffeomorphisms of a differentiable manifold onto itself is being developed and will lead to a new representation of the group G of such diffeomorphisms as a topological group G , with a 0th-order topology as well as with a 1st-order topology. Results of Smale and Royden concerning analytic differentiable isotopies on compact manifolds will be extended to open manifolds. These methods cover the earlier results of Smale and Royden.

Extending (b). This field was initiated by Morse. It is being studied by mathematicians such as Milnor, who will publish a treatise in the ANNALS OF MATHEMATICS STUDIES in 1963 on "Morse's theory of critical points". Kuiper has successfully studied some of the problems raised by Morse in paper 10. This paper introduces a purely topological form of the non-degenerate critical point theory.

In extending (b) Morse will solve a problem left by Kuiper and will open up a new domain of investigation. This new work will introduce for the first time differential caps (i.e. relative k -cycles) associated with the respective critical points of index k of the given function. Such a cap is the union of trajectories orthogonal to the level manifolds of f , trajectories which emanate from a critical point in the sense of decreasing f . In terms of these caps and their intersections it is possible to give sufficient theorems for homeomorphisms of manifolds. One can also give conditions sufficient for the removal by redefinition of f , of pairs of critical points of consecutive indices.

- 3 -

Extending (c). After having proved the theorem indicated in (c) the existence of direct periodic satellites will be studied. The integral J is neither "regular" nor bounded below. However it is believed that the relative homology groups in the space of closed motions in an oval of zero velocity about the two principal bodies, are such as to imply the existence of infinitely many periodic orbits, with different indices.

(d) Between the theory of critical points of functions on the one hand, and the theory of vector distribution on differentiable n -manifolds, M , there is the study of r differentiable functions (f_1, \dots, f_r) on M when $0 < r < n$. By means of the author's theory of critical points of functions under general boundary conditions it is possible by inductive methods to study the critical points of the ensemble (f_1, \dots, f_r) . The case $r = 2$ arises in isoperimetric problems and the situation in this case suggests a general method which will be explored.

Papers of Marston Morse, 1960-1961

1. A reduction of the Schoenflies extension problem, Bull. Amer. Math. Soc., 66 (1960), 113-115.
2. An arbitrarily small analytic mapping into R_+ of a proper, regular analytic m -manifold in E_m , Ist. Lombardo Accad. Sci. Lett. Rend. A, to appear.
3. On elevating manifold differentiability, Jubilee of the Indian Math. Society (1961), to appear.
4. Schoenflies extensions and differentiable isotopies, J. Math. Pures Appl., to appear.
5. Schoenflies problems, Fund. Math., to appear.
6. Harmonic extensions, to be published.
7. Boundary values of partial derivatives of Poisson integral in n -space, An. Acad. Brasil, Ci., to appear.
8. The existence of polar non-degenerate functions on differentiable manifolds, Ann. of Math., 71 (1960), 352-383.
9. The existence of non-degenerate functions on a compact differentiable m -manifold M , Ann. Mat. Pura Appl., 49 (1960), 117-128.
10. Topologically non-degenerate functions on a compact n -manifold M , Journ. d'Analyse Math., 7 (1959), 189-208.

Papers of Marston Morse and William Huebsch, 1960-1961

- 1a. An explicit solution of the Schoenflies extension problem, Journ. Math. Soc. of Japan, 12 (1960), 271-289.
- 2a. Conical singular points of diffeomorphisms, Bull. Amer. Math. Soc., 67 (1961), 490-493.
- 3a. The Schoenflies extension in the analytic case, Annali di Math., 54 (1961), 359-378.
- 4a. The dependence of the Schoenflies extension on an accessory parameter, Journ. d'Analyse Math., 8 (1960-61), 209-271.
- 5a. Schoenflies extensions of analytic families of diffeomorphisms, Math. Ann., 144 (1961), 162-174.
- 6a. Schoenflies extensions without interior differential singularities, Annals of Math., to be published, about 40 pages.

PRESS RELEASE

Word has just been received that Marston Morse of 40 Battle Road, Princeton, New Jersey, Professor Emeritus of Mathematics of the Institute for Advanced Study, has been elected Foreign Correspondent of the Polish Academy of Sciences. This is one of the oldest and strongest academies of science in Europe.

Professor Morse is known as the originator of a new branch of mathematics called Variational Theory in the Large. He is Correspondent of L'Académie des Sciences de Paris, L'Accademia Nazionale dei Lincei of Italy, and other learned societies of Europe.

Institute for Advanced Study
Princeton, New Jersey
July 23, 1963

CC: New York Herald Tribune, 230 W. 41st St., New York 36, N. Y.
NEW YORK TIMES, Times Bldg., 229 W. 43rd St., New York 36, N. Y.
News Report, N.A.S., 2101 Constitution Ave., N.W., Washington 25, D. C.
NOTICES of the A.M.S., 190 Hope St., Providence, R. I.
Princeton Herald, 21 Chambers St., Princeton, N. J.
Princeton Packet, 44 Spring St., Princeton, N. J.
SCIENCE Magazine, 1515 Massachusetts Ave., N.W., Washington, D. C.
Town Topics, 4 Mercer St., Princeton, N. J.
Trenton Times, 500 Perry St., Princeton, N. J.

Harold Marston Morse, prof. mathematics; b. Waterville, Me., Mar. 24, 1892.
A.B. Colby 1914; A.M. Harvard 1915, PhD 1917. Assistant Prof. ~~Exmondix~~
Cornell 1920-25; assistant prof. Brown 1925-26; Harvard 1926-35 (prof 29-35);
prof. Inst. Adv. Study since 35. Emeritus since 1962). Cons. Office Chief
of Ordnance U.S. Army, Nat. Def. Research Com. Chmn. U.S. Nat. Com. Mathematics,
1958- ; v.p. Int. Math. Union 1958- . Fellow Amer. Acad. Arts and Sciences,
Nat. Acad. Sci., A.A.A.S., etc. Many foreign: Circolo Mat. di Palermo, Academic
delle Scienze Bologna, Heidelberg Acad. Scis., French Acad. Scis., Accademia
Nazionale dei Lincei, Italy, Polish Acad. Scis., Corr. mem. Acad. Rumanian
People's Republic. Awards: Croix de Guerre with Silver Star, Chevalier Legion
of Honor; Meritotious Service award, U.S. Army Ordnance, 1944; National
Medal of ~~Max~~ Science, 1964 (presented by President Johnson at White House,
Feb. 8, 1965). Author: Colloquium Lectures on the Calculus of Variations;
Functional Topology and Abstract Variational Theory, and others. Editor:
Composito Mathematica; Princeton Mathematical Series.

From a press release of 8/2/62, announcing the election to the Accademia
Nazionale dei Lincei:

"Professor Morse is known as the originator of a branch of mathematics that
is studied throughout the academic world. His "Variational Theory in the
Large" has been extensively applied in other branches of mathematics, and in
physics. His interests extend beyond mathematics and include the problem of
the proper relation of mathematics to the arts and philosophy. He is the author
of several essays in this field which affirm that the affinity between mathematics
and the arts lies primarily in their modes of discovery, in their intuitive
recognition of beauty."

Morse

PRESS RELEASE

Princeton, N. J., August 2, 1962.

Dr. Marston Morse, Professor of Mathematics at the Institute for Advanced Study, has just been elected foreign member of the Accademia Nazionale dei Lincei of Italy. He is one of about ten scientists in the United States who have been so honored.

This academy is one of the oldest in the world, having been founded in 1603. Its symbol is the sharp-sighted lynx. Galileo was among its first members.

Professor Morse is known as the originator of a branch of mathematics that is studied throughout the academic world. His "Variational Theory in the Large" has been extensively applied in other branches of mathematics, and in physics. His interests extend beyond mathematics and include the problem of the proper relation of mathematics to the arts and philosophy. He is the author of several essays in this field which affirm that the affinity between mathematics and the arts lies primarily in their modes of discovery, in their intuitive recognition of beauty.

sent out by CDU

Morse

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

SCHOOL OF MATHEMATICS

March 29, 1962

Dr. Robert Oppenheimer
Institute for Advanced Study

Dear Robert:

When I asked the Air Force to accept my proposal for research, Pohrer said that because of the lateness they would be able to accept the proposal for one year. He said at the time that a proposal for three years should come in as early as March of this year.

I am therefore anxious to send in this proposal at once. I hope you will find it satisfactory.

Very truly yours,

Marston Morse
Marston Morse

MMcdu
Enclosure

Re signed 3/29/62

February 16, 1962

To: The Faculty

From: A. Beurling, A. Borel, D. Montgomery, M. Morse, A. Selberg, A. Weil

As far as any one of us can remember, we have been guided primarily by the rule of always making the best choices we knew how to make from among our fellow-mathematicians. None of us has ever been aware of any agreement or tradition that could validly interfere with this cardinal principle.

Nothing could be more fatal to us than any visible departure from it; it is largely because we have followed it consistently, and because this has been widely understood and acknowledged, that the Institute has achieved its unique position in the mathematical world.

On the present occasion, we have been gratified to find that this policy has led us to give recognition to the increasing stature of the American mathematical school, which the Institute has in no small way helped to develop.

We do not wish to dictate policy to other groups at the Institute. At the same time, we greatly fear that any attempt to interfere with this principle of ours, on grounds of expediency and appeasement, would have the most serious consequences for us and for the Institute as a whole.

Professors Alföldi
 Cherniss
 Dyson
 Gödel
 Kantorowicz
 Lee
 Meiss
 Meritt
 Oppenheimer
 Paig
 Panofsky
 Strömberg
 Thompson
 Whitney
 Yang

Morse

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

SCHOOL OF MATHEMATICS

January 15, 1962

Dr. Robert Oppenheimer
Institute for Advanced Study

Dear Robert:

I am enclosing something from the Friends of the Princeton Public Library. Because of your children I thought you might be interested.

The Borough and Township are greatly in need of a new public library which would be financed by the Borough and Township. The object of this new organization of Friends is to promote interest and understanding of the public library's function. Back of it is, of course, the hope that these Friends will make the administrators of the Borough and Township so aware of the need that they will take the necessary action.

Cordially yours,

Marston Morse

Marston Morse

MMmp
Enclosure

Morse

cc: Dr. Oppenheimer

Headquarters
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
Office of Aerospace Research
United States Air Force
Washington 25, D. C.

SRMM

8 Nov 61

Professor Marston Morse
School of Mathematics
The Institute for Advanced Study
Princeton, New Jersey

Dear Professor Morse:

Thank you for your letter of 2 November, and the information about your status at the Institute. I appreciate your confirmation and further clarification of your earlier remarks.

May I take this same opportunity to tell you that this Division has technically approved your proposal for research on "Analysis in the Large." You should hear from our Procurement Office shortly. I wish to also add that this present letter is not a commitment, as only AF Procurement Officers have that authority.

This also seems like a good occasion to make reference to possible research support for the two- or three-year period beginning 1 July 63. If it is your intention to continue this research and request support for that period, we would appreciate receiving a corresponding proposal. It should definitely reach us by late Spring, 1962, but it would be entirely appropriate for you to submit it any time before that.

With continued best wishes.

Sincerely,

/s/ R. G. Pohrer

R. G. POHRER
Chief, Mathematics Division

HEADQUARTERS
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
OFFICE OF AEROSPACE RESEARCH
UNITED STATES AIR FORCE
WASHINGTON 25, D. C.



SRMM

31 Oct 61

Dr. Robert Oppenheimer, Director
The Institute for Advanced Study
Princeton, New Jersey

Dear Dr. Oppenheimer:

We wish to acknowledge the receipt of the
proposal entitled "Analysis in the Large" prepared
by Professor Marston Morse.

We will advise you of our decision on this
proposal as soon as possible.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. G. Pohrer".

R. G. POHRER
Chief, Mathematics Division

cc: Prof Morse

Fac *Morse*
cc: AFOSR - 15
✓ Mrs. Hobson - 1
Mr. Morgan - 1

PROPOSAL FOR ONE-YEAR GRANT FROM
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
SUBMITTED BY THE INSTITUTE FOR ADVANCED STUDY, PRINCETON, NEW JERSEY

The bidder represents that he has not employed or retained a company or person (other than a full-time employee) to solicit or secure this grant, and agrees to furnish information thereto as requested by the Air Force Office of Scientific Research.

Estimated budget, July 1, 1962 to June 30, 1963:

Salary for Professor Marston Morse	\$12,000.00
Overhead (25 percent of salary)	<u>3,000.00</u>
	\$15,000.00

APPROVED FOR
THE INSTITUTE FOR ADVANCED STUDY:

Robert Oppenheimer, Director

Date October 26, 1961

PROGRAM OF MARSTON MORSE FOR YEAR JULY 1, 1962 TO JUNE 30, 1963.

The title of the program would be "Analysis in the Large". It would include work on differential topology and celestial mechanics.

On the differential topology side the program would start with a proof of the following very general theorem.

Theorem. Let E be a euclidean n -space, S an $(n-1)$ -sphere in E and z an arbitrary point on S .

A real analytic diffeomorphism f of S into E admits an extension F as a homeomorphism of E onto E , such that the restriction of F to $E - z$ is a real analytic diffeomorphism of $E - z$ onto $E - z$, and such that F is analytic and regular at the "point at infinity" in the sense of the geometry of inversion.

(1) Other theorems, to be presented, will show how general such extensions are, how they may be varied, and the general nature of the singularity at z (if any). Extensions F will be shown to exist, carrying a finite number of prescribed points not on S into a finite number of prescribed points not on $f(S)$, provided this prescription is consistent with F being a homeomorphism of E onto E extending f . New methods must be introduced to obtain these results.

(2) In "Differential Topology" proper Morse's papers numbers 8 and 9 are preliminary to a theory to be introduced on the classification of compact differential manifolds M (with a Riemannian metric). The elements are the critical points of a non-degenerate function F on M , together with a subset A of the trajectories orthogonal on M to the level manifolds of F . This subset A is the set of orthogonal trajectories which emanate from the critical points of F . The functions F will be "reduced" in the spirit of reference 8. The end result will be new theorems on diffeomorphisms between manifolds, involving in certain cases, singularities dependent on F and A .

This work will connect up with paper 4 on "differential isotopies". In paper 4 Morse gives a necessary and sufficient condition that a sense-preserving C^∞ -diffeomorphism of S into E be differentially extendable as a diffeomorphism of E onto E without singularity. A previous important theorem of Milnor gives a sufficient condition in the special case that f maps S onto S . No necessary condition is given by Milnor nor any theorem when f maps S into E (not S).

(3) Morse plans also to verify his conjecture that in the restricted problem of three bodies, as defined by Poincaré, there always exists at least one retrograde periodic orbit of the infinitesimal body. The mode of proof will be one that is new and depends on minimizing the J -height of a highest periodic curve in a suitably chosen, relative 1-cycle of periodic curves. Here J is the modified form of the Jacobi Least Action Integral, as defined by Birkhoff. A proof of this theorem will undoubtedly throw light on the baffling problem of the existence of direct periodic orbits in the restricted problem of three bodies.

Papers of Marston Morse, 1960-1961

1. A reduction of the Schoenflies extension problem, Bull. Amer. Math. Soc., 66 (1960), 113-115.
2. An arbitrarily small analytic mapping into R_n of a proper, regular, analytic r -manifold in E_m , Ist. Lombardo Accad. Sci. Lett. Rend. A, to appear.
3. On elevating manifold differentiability, Jubilee of the Indian Math. Society (1961), to appear.
4. Schoenflies extensions and differentiable isotopies, J. Math. Pures Appl., to appear.
5. Schoenflies problems, Fund. Math., to appear.
6. Harmonic extensions, to be published.
7. Boundary values of partial derivatives of Poisson integral in n -space, An. Acad. Brasil. Ci., to appear.
8. The existence of polar non-degenerate functions on differentiable manifolds, Ann. of Math., 71 (1960), 352-383.
9. The existence of non-degenerate functions on a compact differentiable m -manifold M , Ann. Mat. Pura Appl., 49 (1960), 117-128.

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

SCHOOL OF MATHEMATICS

October 26, 1961

Dr. Robert Oppenheimer
Institute for Advanced Study

Dear Robert:

I talked with Dr. R. G. Pohrer who is the Chief of the Mathematics Division of the Air Force Office of Scientific Research. As reported by Dr. Knox Millsaps, Executive Director of the Office of Scientific Research, they are short of funds for next year, effective July 1, 1962. However, they will receive (and favorably I think) an application for a "grant" from the Office of Scientific Research for the support of my program of research for one year. This does not mean that sometime during the year one could not apply for an extension for the following year.

I have drawn up a proposal for this grant which seems appropriate, and have included a statement of my program together with a relevant bibliography. This program and bibliography should be sent with the proposal.

With my thanks for your interest in this matter, I am

Very truly yours,

Marston Morse

Marston Morse

MMcdu
Enclosures

*RO signed proposal.
Returned 10/27 to C.D.U.*

5 October 1961

Dear Atle:

Marston has asked me to let you know that he would now prefer it if you would ignore his letter to you of October 2nd. If we must return to it later, you will hear from me.

Very sincerely,

Robert Oppenheimer

Professor Atle Selberg
The Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

October 2, 1961

Professor Atle Selberg
Institute for Advanced Study

Dear Atle:

Last year I spoke with Dr. Oppenheimer and some of you about a contract for my research program for the academic year 1962-63, the money, approximately \$12,000, to be taken from the Air Force or NSF funds.

This year I have obtained fundamental results concerning the Schoenflies extension problem in the analytic, as well as in the differentiable cases. For example, I have just proved the following theorem.

Theorem. Let E be a euclidean n -space, S an $(n-1)$ -sphere in E , z an arbitrary point on S . Let f be an analytic diffeomorphism of S into E . There exists an extension F of f which is a homeomorphism of E onto E , whose restriction to $E - Z$ is an analytic diffeomorphism of $E - z$ onto $E - z$, and which is regular and analytic at ∞ in the sense of the geometry of inversion.

Outstanding is the nature of the singularity at z . This is one of the problems that I shall attack next year.

I shall also study differentiable isotopies. This is a field to which Milnor has contributed. I have a theorem which goes considerably beyond Milnor's theorem.

There are theorems on the classification of compact differentiable manifolds which can be couched in terms of non-degenerate functions on such manifolds and a subset A of the orthogonal trajectories to the level manifolds of such functions. The subset A is the set of trajectories which emanate from the critical points of the function. No general theory of this type is in existence. I shall initiate such a theory.

I shall also verify a conjecture made by me some time ago, that in the restricted problem of three bodies there always is at least one retrograde periodic orbit of minimax type. The function whose critical extremals are examined is the Jacobi Least Action Integral. No such theorem as this has been established by Birkhoff or anyone else. I think the examination of the proof of this theorem may open up the baffling problem of finding the

Professor Atle Selberg

- 2 -

October 2, 1961

topologically necessary direct period orbits. This will not be approached by way of Poincaré's geometric theorem, which I have reason to believe is inadequate.

This gives an idea of a few of the things I propose to do.

The School of Mathematics should decide on this without my presence.

Sincerely yours,

Marston Morse

MMcdu
CC: ✓ R. Oppenheimer

COOP

UNIVERSITY OF MAINE
ORONO, MAINE



DEPARTMENT OF MATHEMATICS AND ASTRONOMY

STEVENS HALL

January 10, 1961

Secretary
Institute for Advanced Study
Princeton, New Jersey

Dear Sir:

I should like to recommend to our President and Board of Trustees that Professor Marston Morse be given an honorary doctorate from the University of Maine. This would seem particularly fitting since he is a native of this state.

If it is not too much trouble for you I would appreciate receiving any data you may have readily available and which can be used to support the recommendation. I seem to recall having seen some Institute report on Professor Morse's varied activities and honors, but cannot remember where.

All I can do is recommend this matter, of course, but wish to make the case as strong as I know it can be made.

Sincerely,

Spofford H. Kimball, Head
Department of Mathematics
and Astronomy

SHK:rd

cc Mr. Morgan

20 April 1959

Dear Professor Morse:

The Trustees of the Institute, meeting on April 18th, have fixed your salary, and that of your colleagues, at \$22,500 a year, starting July 1, 1959.

I am glad to tell you the good news.

Very sincerely,

Robert Oppenheimer

Professor Marston Morse
The Institute for Advanced Study

THE INSTITUTE FOR ADVANCED STUDY

Princeton, New Jersey

April 9, 1959

The Faculty
The Institute for Advanced Study
Princeton, New Jersey

Dear Colleagues:

Having heard and read so much concerning the future location of our library, you will perhaps bear an additional word of clarification. This letter is written not for the purpose of amendment of any previous record, letter, or committee report, but to make sure that a point of view is understood. I have participated in the development of Fuld Hall so intensely from its infancy that I would regret any misunderstanding of my conception of its optimum future use. I shall recall what I said at our last Faculty Meeting. This statement was substantially as follows:

My colleague, Professor Panofsky, hopes that the main reading room may be converted into a Common Room for the use of Faculty (and, I presume, Members) of the Institute. Professor Weil has just indicated his approval of this idea. A proposal of this nature was discussed by the Faculty-Trustee Committee. I have always approved of this idea, and not only approved, but approved enthusiastically.

Moreover, in case the libraries of the two schools should be separated, in no sense would I like to see Fuld Hall become a Hall primarily for the mathematicians. In particular, if the libraries should be separated, various rooms would be vacated, including most of the offices of the librarians, the various rooms now used for libraries for the School of Historical Studies, and possibly the room housing the Rosenwald Collection. I would hope that the members of the School of Historical Studies would not only retain all of their offices now in Fuld Hall, but share equitably in the occupation of the rooms vacated.

Over the years, there have been progressive changes in the use of our present Common Room. I believe that the cultural and intellectual life of the Institute would be facilitated by a restoration, in a new location, of the original kind of Common Room. (End of Quotation)

Very truly yours,

Marston Morse

MMmn

Princeton Historical Society, November 19, 1958.

The fundamental philosophy of the Institute for Advanced Study was formulated by its first director, Abraham Flexner. To understand this philosophy it is necessary to understand something of the history and character of Flexner. Without being a creative scholar himself, Flexner had an enormous respect for research and learning. The immediacy of knowledge was to him no measure of its value. His experience in the process of remodeling medical education had given him an insight into the burden of organization and administration. He knew that administrative duties, while necessary in their place, were incompatible with creative scholarship. He foresaw a future in which universities would get bigger and bigger, where science and scholarship would be dragged into the market place, and made to serve a multiplicity of purposes, -- some of them sound, but almost all of them destructive of that peace and freedom which are essential for true reflection and discovery.

In long conversations with Mr. Bamberger and his sister, Mrs. Fuld, around 1930, he presented these ideas with the persuasiveness of a man who knew well what he was talking about. He brought the matter to a focus in his proposal that an Institute for Advanced Study be founded. Mr. Bamberger and Mrs. Fuld were persuaded but deliberate. They agreed with Dr. Flexner that fundamental questions must be studied. What should be the subjects which the Institute should first attack, what scholars should lead, what conditions of study would be most effective for such an institute?

With Mrs. Flexner, Dr. Flexner was off to Europe, to Berlin, Paris, Oxford and Cambridge. He talked with Hadamard in Paris, Gilbert Murray and the physiologist Hill in England. In the course of time he

- 2 -

came to the conclusion that the Institute should begin with one subject and he hit upon mathematics for three reasons. I quote:

"(1) Mathematics was fundamental;

"(2) It required the least investment in plant or books;

"(3) It had become obvious to me that I could obtain greater agreement upon personnel in the field of mathematics than in any other subject."

Although Dr. Flexner does not record the following fact in his book "I Remember," I knew by virtue of my position as Professor of Mathematics in Harvard that Flexner discussed the question of establishing the Institute in Cambridge with President Lowell. The exact details of the conversation did not filter down to the Department of Mathematics, but enough did come through for us to know that Flexner and Lowell were not of one mind. Lowell was not ready to grant that autonomy which Flexner deemed essential. The story was quite otherwise with Hibben, then President of Princeton. The new Institute would be welcome to share Fine Hall with the Princeton Department of Mathematics and with complete autonomy. With this decision President Dodds, Hibben's successor, heartily agreed. Thus Fine Hall became the first seat of the Institute for Advanced Study. As Professor Panofsky will tell you, the classicists, historians and economists who were added to the Faculty shortly after the first mathematicians occupied the white frame building at the corner of Alexander Street and College Road. I must add a note of nostalgia to all this. Those first years in Fine Hall were very pleasant. There was a sense of leisure and peace about Fine Hall in those days which it would be difficult to recapture in the atomic era.

The problem of selecting the first professors of mathematics was slowly but surely solved. Einstein was first approached while lecturing in California. As one would expect of Einstein, his enthusiasm was great and

- 3 -

grew steadily greater. He had little idea of the practical aspects of the matter, but this was not necessary since Dr. Flexner and Mrs. Einstein readily arranged for his future remuneration and security. The decision of Hermann Weyl to come to the Institute was difficult. He had strong ties in Europe. But the storm which Hitler was brewing was in the offing so that Weyl came finally to cast his lot with the Institute. Philosopher and historian of science, a moldier of the mathematics in relativity and quantum mechanics, he was a tower of strength for the Institute.

On the American scene, Oswald Veblen was at once ready for the ideal new adventure. Together with Flexner he did more than anyone else to determine the conditions under which the Institute should start. He confirmed the view of others with whom Flexner talked that Alexander and von Neumann should be invited to be Professors. He included me in his list and sought my consent two years before I was ready to give it in 1935. It is of interest that three of the Professors now at the Institute for Advanced Study were formerly Professors at Harvard University. I believe the reasons why we were willing to leave Harvard, and at the same time regretted it, were held in common. In my own case, I was Chairman of the Board of Tutors of Mathematics, was slated to be Chairman of the Department, and was immersed in the very heart of my research. I valued all of these activities, but knew that it would be impossible to carry them all out simultaneously. I made my decision to come to the Institute and have not been sorry for it.

You have read during the last week of the award of the third Fermi Prize to Eugene Wigner of Princeton University. My colleague, John von Neumann came to this country around 1930, Eugene Wigner came around 1932. I was with Wigner on the boat that brought him to the United States. The

- 4 -

story of how these two great mathematicians made their genius felt, and in the course of twenty-five years rose to the point of receiving the ultimate Fermi award from Congress, is without parallel in our history.

The pure mathematicians who have been added to the Faculty of the Institute since the early days are as follows:

Carl Ludwig Siegel, eminent German mathematician, came to the Institute as a Member in 1940 and was a Professor from 1945 to 1951. The influence of his writings and of his teaching has been very great. He was one of the first of the German scholars to return to Germany after the war. There is a possibility that he may return to the Institute during the year of 1959-60.

Six other pure mathematicians have been added to the Faculty since 1950. Each of them deserves a special account. I shall mention just two, Kurt Gödel and Hassler Whitney. Gödel came to the Institute in 1946 and became Professor in 1953. He is counted by many as the greatest logician since Aristotle. Certainly his methods in logic are studied wherever logic is studied. He was Einstein's closest companion in Einstein's last years.

I shall also mention Hassler Whitney who was at one time my colleague in Harvard. I have the greatest admiration for his geometric insight. He has introduced many new concepts into mathematics. Withal he is most human. You may see him playing the viola in the Princeton Symphony. If you have the habit of climbing the highest mountains in the Alps, you might very well meet him at the summit of a peak on any summer's day.

x In the field of physics, as distinguished from mathematics, three Professors and four Members of the Institute have received Nobel Prizes. As you doubtless remember, Einstein received the Nobel Prize in 1922 before

x
1 Four since 1960

he ever came to the Institute.

Wolfgang Pauli was born in Vienna. He was a Visiting Professor at the Institute at various times between 1935 and 1946. He received the Nobel Prize in 1945. Einstein regarded Pauli at one time as his successor at the Institute. Like Niels Bohr, Pauli has been a frequent visitor at the Institute, and has always brought words of wisdom.

Isidor Rabi was a Member of the Institute for Advanced Study in 1939. I have a particular interest in him because I taught him the mathematics of relativity in 1921 in Cornell University. He received the Nobel Prize in 1944.

Hideki Yukawa was a Member of the Institute for Advanced Study in 1948-49 and received the Nobel Prize the same year. An equally distinguished Japanese mathematician, Professor Kodaira, is shared by Princeton University and the Institute. Like Yukawa, Kodaira has received the highest honors from the Emperor of Japan.

May I interpolate the following remark? The last count which I have made of the number of foreign nations represented at the Institute for Advanced Study gave the number fifteen.

Paul Dirac came to the Institute in 1934 as a Visiting Professor. He is a Member here again at this time and has visited the Institute several times between 1934 and 1948. He received the Nobel award in 1933, the only Member of the Institute for Advanced Study to receive the Nobel Prize before he was a Member. John D. Rockefeller is remembered for his distributions of dimes. Dirac is remembered for distribution. S Period, I will let this mathematical enigma pass.

Chen Ning Yang is the young Chinese physicist whose name together with that of his colleague T. D. Lee has been associated with

parity, or rather with the rejection of the axiom of parity. Lee was a Member of the Institute for Advanced Study first in 1951-53 and again a Member in 1957-58. Yang is our youngest Professor of Physics. His clarity of thought, insight and fidelity to experimental knowledge are regarded as truly exceptional by his colleagues.

I have referred to these Nobel Laureates, not because I attach undue importance to Nobel Prizes, but because to you as historians there is something objective and impersonal in such a Nobel award. These awards give evidence over and above my own subjective bias in favor of my colleagues.

The prizes open to mathematicians are not taken too seriously by mathematicians so that I need not burden you with the list of their numerous awards. What is perhaps more significant is that the influence of the School of Mathematics is felt throughout the world in an extraordinary way. Last summer an International Congress of Mathematicians was held in Edinburgh and was attended by 1,600 mathematicians from all over the world including Russia and its satellites. There were sixty invited addresses. Of these sixty approximately half were given by members or former members of the Institute for Advanced Study.

My account of the Institute would be inadequate if I did not mention the presence in our midst of psychologists. For reasons which may seem strange, psychologists are accredited to the School of Mathematics. To me their presence has, on several occasions, become very real. The French psychologist Piaget tells us of the psychology of learning and especially of the learning of the young. In this field I have much clinical evidence with my seven children. And anyone who loves adventure must find the psychologist Köhler of interest. The philosopher Whitehead said that he could learn even from his students. Köhler learns even from his animals,

and learns how they learn. But Whitehead and Köhler had extraordinary powers of perception.

I have left to the last the problem of telling you what the mathematicians do at the Institute for Advanced Study because this is the hardest task. I can say in a negative sense that we have no required lectures or courses, no deans, no tuition, and no football teams except the impromptu ones that come to life on a good fall day on the green in back of the Institute. The intellectual life at the Institute is something like a Quaker Meeting. You speak when the spirit moves you. There are seminars of all sorts; seminars to hear what the Members are doing in their own research, and seminars to read together the more significant memoirs on present day mathematics.

A Member, no matter how young, can give a seminar, provided he can find a group of mathematicians who think it profitable and interesting to listen to him. The art of collaboration is highly developed at the Institute.

There exists a deep underground of mathematical conjectures and rumors. Some conjectures are proved or disproved or elaborated into major theorems over night. Other problems defy the years.

With all this individuality, this freedom and independence, the main tree of mathematics takes visible and definite form. The great conceptions of Hilbert and Poincaré, and the rest of modern mathematics, are shaped and evolved from day to day. There is infinitely much to be done but mathematicians are not lost in this infinitude.

A word may be appropriate as to the successors of Flexner. Dr. Aydelotte became Director in 1939 and Dr. Oppenheimer in 1947. Dr. Aydelotte was destined to be our war-time Director. With his generous

consent and that of the Trustees, many of us were permitted to serve the country in those ways in which we were best adapted to serve. Dr. Aydelotte called on the Faculty for advice more than did Dr. Flexner, and the Faculty responded in a way which I believe added to the structural soundness of the Institute. Those of us who knew him best respected him and loved him.

Dr. Oppenheimer became Director in 1947. How much the Institute has changed since he became Director is shown by the fact that all of the Professors of Mathematics and Physics now on the Faculty except myself have become Professors at the Institute under his Directorship. He is one of the very few Directors of research institutions in this country who is himself both a Director and a great research scientist. We are grateful for his imaginative leadership which has extended far beyond the domains of mathematics and physics, and which has provided for us and for many others a satisfying cultural home. In mathematics we have been permitted to share and are glad to share with Dr. Oppenheimer the responsibility for what the Institute has become in mathematics. It has been a labor of love.

My account to you of this world of mathematicians has been inadequate. To truly understand it you must be immersed in it. Yet I think I can rely on your sympathetic understanding to complete the picture which I have attempted to paint. The universe of mathematics is a part of a larger universe whose meaning you historians have the responsibility to interpret. I hope you will find the proper place in this larger world for mathematics.

Marston Morse

Morse

3 June 1957

Dear Professor Morse:

As you know, the Trustees of the Institute for Advanced Study have been considering the adequacy of retirement and pension arrangements, both for the Faculty and for others who are in the employ of the Institute. Their deliberations have led to some changes in policy, all of which should be favorable for the employee, and some of which affect you.

1. The mandatory age for retirement for members of the Faculty has been advanced to the June 30th following their 70th birthday.

2. The Institute will allocate the maximum that it may, which is fifty per cent of the total annual contribution that you and the Institute make toward your retirement, to College Retirement Equities Fund. This fund has been established in order that beneficiaries may be provided with a hedge against inflation, through investment in equities whose value and whose income have increased with the years in the past, and are expected to increase in the future. The Trustees are aware of the fact that benefits from C.R.E.F. vary as provided in C.R.E.F. contracts, and are not guaranteed as those accruing under T.I.A.A.; but they believe that, under the C.R.E.F.-T.I.A.A. arrangement, your total pension is far more likely to exceed that provided by T.I.A.A. alone than to fall below this sum.

Within the next months you will receive a new contract from T.I.A.A. describing the provisions under which your retirement benefits will be paid. Should you have any questions about that contract or this letter, or the matters touched upon in it, please do not hesitate to let me know.

Very sincerely,

Robert Oppenheimer

Professor M. Morse
Institute for Advanced Study

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PRESS RELEASE:

June 7, 1956

Word has just been received at the Institute for Advanced Study of Princeton, New Jersey, of the election of Marston Morse, Professor of Mathematics at the Institute as "Correspondant" of the French Academy of Sciences. The total number of American "correspondants" and associates of the French Academy is now ten. Professor Morse is known throughout the mathematical world as the originator of one of the few branches of mathematics created this century. It is called "Variational Theory in the Large" and has been extensively applied in other branches of mathematics and physics. Van Hove, a Belgian physicist, has recently applied this theory to the crystalline structure of solids.

Professor Morse succeeds Frederic Riesz, Hungarian mathematician, as "Correspondant" of the Academy. Riesz himself was the successor of David Hilbert, the great German mathematician.

The first French Academy of Sciences was founded in 1666 and included Descartes and Pascal as members.

cc sent CDO Morse

HEADQUARTERS
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

AIR RESEARCH and DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

6 December 1955

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE
TO COMDR. AFOSR, ATTENTION FOLLOWING OFFICE SYMBOL

SROAM

Mr. Robert Oppenheimer
Director
The Institute for Advanced Study
Princeton, N. J.

Dear Mr. Oppenheimer:

With reference to your letter of 1 December 1955, the Air Force Office of Scientific Research is considering Professor M. Morse's proposal entitled "Research in Theory of Complex Variables and Differential Equations."

We will inform you of our decision regarding this proposed research in the near future.

Sincerely,

Oliver A. Shaw

OLIVER A. SHAW
Major, USAF
Research Administrator
Mathematics Division

RECEIVED
1955 DEC 10 11 30 AM
AFOSR

ADDRESS OFFICIAL COMMUNICATIONS TO
THE SECRETARY OF STATE
WASHINGTON 25, D. C.

DEPARTMENT OF STATE
WASHINGTON

Fac - Morse
copy given to
Caroline Underwood

Lecture: 4/15/55 for 3 months



In reply refer to
IES

July 28, 1954

My dear Dr. Oppenheimer:

It is a pleasure to inform you that a member of your staff, Dr. Harold Marston Morse, has been selected by the Board of Foreign Scholarships to receive an award to participate in the International Educational Exchange Program under the Fulbright Act. Enclosed is a copy of an announcement giving details of this award.

A copy of this letter and three copies of the announcement are being sent to the Fulbright representative on your campus with the request that he publicize this award in a suitable manner.

From time to time you may receive announcements of similar grants to other individuals connected with your institution. Applicants for lecturing and research grants who have not yet been notified of the outcome of their candidacies may be assured that applications are being processed as rapidly as possible and that they may expect to be informed of decisions within the near future.

The cooperation of the colleges and universities in the educational exchange program is appreciated.

Sincerely yours,

For the Secretary of State:

J. Manuel Espinosa, Chief
Professional Activities Division
International Educational Exchange Service

Enclosure:

Announcement of United States
Educational Exchange Grant.

J. Robert Oppenheimer, Ph.D.,
Director, Institute for Advanced Study,
Princeton, New Jersey.

ANNOUNCEMENT OF
UNITED STATES EDUCATIONAL EXCHANGE GRANT

The Department of State has announced the awarding of a grant to

Name : Harold Marston Morse, Ph.D.
Title : Professor of Mathematics
Institution in U.S.: Institute for Advanced Study
Purpose of Grant : To lecture in Mathematics
Institution Abroad : College de France, Paris

The award is made under the provisions of Public Law 584, 79th Congress, the Fulbright Act. It is one of approximately 375 grants for lecturing and research abroad included in the program for the academic year 1953-54. As provided by the Act, all candidates are selected by the Board of Foreign Scholarships, the members of which are appointed by the President. Lecturers and research scholars are recommended for the Board's consideration by the Conference Board of Associated Research Councils, which has been designated to receive and review the applications of candidates in these categories.

The funds used for carrying out the program under the Fulbright Act are foreign currencies realized through surplus property sales abroad. Under executive agreements with foreign governments, programs are currently in effect in the following countries: Australia, Austria, Belgium, and Luxembourg, Burma, Ceylon, Denmark, Egypt, Finland, France, Germany, Greece, India, Iraq, Italy, Japan, the Netherlands, New Zealand, Norway, Pakistan, the Philippines, South Africa, Sweden, Thailand, and the United Kingdom.

September 24, 1953

Dear Professor Morse:

We just received the enclosed telegram and Dr. Oppenheimer would be grateful if you could send out an answer to this.


Sincerely yours,

Jutta Cords
Secretary

Prof. M. Morse
At the Institute

SOUTHWESTERN HOTELS
In New Mexico
LA FONDA, SANTA FE
THE ALVARADO, ALBUQUERQUE
EL NAVAJO, GALLUP
In Arizona
LA POSADA, WINLOW
In Grand Canyon National Park
EL TOVAR HOTEL
BRIGHT ANGEL LODGE

La fonda



The Inn at the End of the Trail
Santa fe, New Mexico

Baroness to Paul Sept 9th

Dear Kelly and Robert

We are leaving for home

This afternoon on the train -

Marston is in fine condition

and looks like a "new man"

He did not have a coronary

occlusion, as was at first

suspected, but merely an

attack of fibrillation - brought on

by over-exertion in the hot sun

& altitude. Dr. Haensler has been

most cautious and thorough

extensive experience with doctors
I have never encountered a
more competent or devoted
physician! Just knowing
him has been a rewarding
experience and his
superb care has been more
than reassuring.

Brother Beckelbren has been
our angel. How grateful I
am to you for getting me
in touch with her! I can't tell
you how thoughtful and nice
she has been
with many thanks to you for
your helpfulness and understanding.
Affectionately,
Harris.

THE INSTITUTE FOR ADVANCED STUDY
OFFICE OF THE DIRECTOR
PRINCETON, NEW JERSEY

Telephone call from Louise Morse; Wednesday a.m.

Electrocardiogram indicated no coronary or stroke as originally thought. Professor Morse has a heart condition, which he did not know about, and which will only mean reducing his activities a bit. Everything looks quite good; and the Morse's expect to be home in a week or so.

Mrs. Morse had a nice visit with Dorothy McKibben and expects to see her again. There is nothing we can do for them, either in Princeton or in Santa Fe.

Mrs. Morse delayed calling until she had the doctor's report.

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

*For
Morse*

SCHOOL OF MATHEMATICS

April 13, 1953

Dr. Robert Oppenheimer
Institute for Advanced Study

Dear Dr. Oppenheimer:

May I express to you and to the Trustees of the Institute for Advanced Study my appreciation of their action in changing the regulations as to the retirement of members of the Faculty of the Institute, and of their action in making \$1,000 a year available for professional travel. Insofar as I can properly evaluate acts which directly affect me, I find these changes wise from the point of view of the Institute's future and considerate of the human needs of the Faculty.

Please convey my thanks to the Trustees and my determination to forward the ideals of the Institute with all the powers at my command.

Sincerely yours,

Marston Morse

Marston Morse

MMedu

April 6, 1953

Dear Professor Morse:

At a regular meeting of the Board of Trustees of the Institute for Advanced Study on April 3, 1953, it was voted:

(1) To make available to you, as to all members of the Faculty, \$1,000 a year as a fund for your professional travel. This fund, if not required by you in any one year, may accumulate, but will not at any time exceed \$3,000. It is to be available to you only for these purposes, and only as long as you are a member of the Faculty of the Institute;

(2) To alter the provisions for your retirement-- as for all members of the Faculty--in that retirement, which has until now been mandatory as of the June 30th following your 65th Birthday, will now become optional with you from your 65th Birthday on, and will be mandatory only as of the June 30th following your 68th Birthday.

Yours sincerely,

Robert Oppenheimer

Professor Marston Morse
Institute for Advanced Study
Princeton, N. J.

THE INSTITUTE FOR ADVANCED STUDY
PRINCETON, NEW JERSEY

7
Fac
No talked
my phone
of pencil
9/14/51

SCHOOL OF MATHEMATICS

September 13, 1951

Dr. Robert Oppenheimer
Institute for Advanced Study
Princeton, New Jersey

Dear Robert:

The problem of getting basic Russian papers in mathematics translated is a very difficult one. The American Mathematical Society, in a letter to me, tells me that they have used up most of their money on the Navy contract. In addition to not only translating the papers they also mimeograph them, making a total cost which is considerable.

There is a paper on the "Topology of Function Spaces and Calculus of Variations in the Large" by Lyusternik of 1947, amounting to ninety-six pages, which will be of great interest to a number of mathematicians. I could get the paper translated for \$500 and our secretarial staff could make it available with a small number of copies to interested mathematicians.

Is there not some fund in the Institute, Publication or otherwise, from which this \$500 could be obtained?

Very truly yours,

Marston Morse
Marston Morse

MMcdu

THE INSTITUTE FOR ADVANCED STUDY

PRINCETON, NEW JERSEY

*For
Morse*

SCHOOL OF MATHEMATICS

February 23, 1951

Dr. Robert Oppenheimer
Institute for Advanced Study
Princeton, New Jersey

Dear Robert:

You perhaps know that quite against my wishes I was appointed Chairman of the new Division of Mathematics of the National Research Council. I have been among those who have urged the setting up of this new Division for about ten years. I had strongly recommended Marshall Stone as Chairman of the new Division. Bronk and his advisors, however, do not seem to have quite enough confidence in Stone to appoint him to this position as yet, though at my suggestion they will probably appoint him Chairman at the end of a year, which was the maximum length of time that I stated I was willing to serve. They have also appointed an Executive Secretary, John R. Kline, with a salary. He is to work part-time in administering the affairs of the Division. He will take charge of the administration of the fellowships and the secretarial work, leaving me with responsibility of initiating those processes which will lead to the new appointment to the Division both of societies and individuals. I shall have to initiate policies which may determine the committees to be attached to the new Division.

I do not regard this task very arduous nor one likely to take much time. There were committees of the old Division of Mathematics and Physical Sciences, such as the Committee on Computation headed by von Neumann, which are set to do some of the principal tasks. A committee on liaison with the armed forces will probably be set up, but this again is already established in the Policy Committee of the four mathematical societies and will hardly need more than a formal transference.

Another need for the new Division was to take care of international relations. The fundamental job here of setting up a new union is already nearly completed, Marshall Stone having done most of the work. It remains to ask the National Research Council to become the organization through which we adhere to the new Union. The statutes and bylaws are complete and the mechanism is ready. All that is lacking is the money to pay the dues and the traveling expenses of the delegates to the assemblies of the new Union.

As you see, things are in pretty good order so that I have very little more to do than I would have to do in any case as a responsible member of the mathematical community. As I stated above I intend to ask for a successor at the end of the fiscal year 1951-52.

Sincerely yours,

Marston Morse
Marston Morse

MMcdu

THE INSTITUTE FOR ADVANCED STUDY
SCHOOL OF MATHEMATICS
PRINCETON, NEW JERSEY

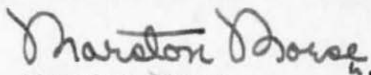
January 24, 1951

Dr. Robert Oppenheimer
Institute for Advanced Study
Princeton, New Jersey

Dear Robert:

I want to acknowledge with thanks your letter telling me that the Board of Trustees has voted to increase my salary as Professor in the School of Mathematics as of the beginning of the next fiscal year, July 1, 1951. Please convey to them my deep appreciation of this.

Sincerely yours,


Marston Morse

MMcdu

January 19, 1951

Dear Professor Morse:

It gives me pleasure to inform you that by unanimous vote of the Board of Trustees of the Institute for Advanced Study, your salary as Professor in the School of Mathematics has been increased to \$18,000 per year as of the beginning of the next fiscal year, July 1, 1951.

Robert Oppenheimer

Professor Marston Morse
Institute for Advanced Study
Princeton, N.J.

Copy: Miss Trinterud

THE INSTITUTE FOR ADVANCED STUDY
SCHOOL OF MATHEMATICS
PRINCETON, NEW JERSEY

November 15, 1950

Mrs. John D. Leary
Institute for Advanced Study

Dear Mrs. Leary:

The recent appointment of Professor Marston Morse as a Member on the National Science Board of the National Science Foundation was made by the President of the United States on November 8, 1950. This appointment has yet to be confirmed by the United States Senate, but he has taken the oath of office and it has been announced in the newspapers.

Sincerely yours,

Caroline D. Underwood
Secretary,
School of Mathematics

Dr. Oppenheimer:

Prof. Morse would like to know if you could recommend a man for Physics Department next year at Colby College, Waterville, Maine. Bixler is president and I believe asked Morse to get your opinion.

The man retiring is head man in department, which is small. Salary would be around \$6,000. Primarily teaching, but they want man who can do some research; good personality. They expect to get some government money and are interested especially in someone with research ability. Subject - nuclear physics.

Colby is small; has some \$7 million endowment; I think one of oldest New England colleges.

EWL

RA talked to
Professor Morse

Dr. Oppenheimer

THE INSTITUTE FOR ADVANCED STUDY
Founded by Mr. Louis Bamberger and Mrs. Felix Fuld
PRINCETON, NEW JERSEY

*Fae
Morse*

December 8, 1949

Dear Professor Morey:

Welcome back to this country, to you and Mrs. Morey! Louise and I hope to see you sometime before you start back to Italy again.

I am writing to tell you that two distinguished Italian mathematicians:

Professor Fabio Conforto, University of Rome, - Via Livorna 20, Rome, and Professor Beniamino Segre, University of Bologna, Italy have been invited to spend the fall term 1950 as members of the Institute for Advanced Study for the purpose of research, with stipends of \$2,500 each. These men will undoubtedly come in time to attend the International Mathematical Congress in Cambridge, Massachusetts, starting August 30. They will come to the Institute immediately thereafter and stay at least until sometime in December, and may stay as long as they please.

Professor Segre is regarded as one of the two or three most interesting and able mathematicians of his age in Italy (around forty). He has been invited to give a special address at the International Congress, a considerable honor. I have just written Segre notifying him of his appointment, and asking him to get in touch with your office at the American Embassy in Rome to make an application for a grant for travel aid under the Fulbright Act. I hope it is not too late for this request to be successful. If there is anything more which we can do at this end to back this request, please let me know.

Yours sincerely,

Professor C. Rufus Morey
Dunbarton Oaks Research Library and Collection
3101 R Street
Washington 7, D.C.
MM:GB

Marston Morse

Copy sent Care Mrs. Brown
McCormick Hall
Princeton

June 9, 1949

Professor Morse:

Would you be interested in writing
this article about the Institute? We have held
it until the Grolier Society sent us the attached
sample sheets.

(Mrs. John D. Leary)

*Security
Morse*
April 6, 1948

Morse, [Harold] Marston

A.B. 1914 Colby College
A.M. 1915 Harvard
Ph.D. 1917 Harvard
Hon.D.Sc. 1935 Colby College
Dr.h.c. Dec.12/46 Univ.Paris

Born Mar. 24, 1892, Waterville, Maine

Citizenship and nationality - U.S.

Married (2d) Jan.13,1940; 2 adult children, 4 small children

Princeton home address - 40 Battle Road

Telephone 757

Honors and societies:

Trustee Colby College 1934-37; 1938-41

NAS 1932- (Chmn. Sect.of Math. 1941-43; Chmn. NAS-NRC Com.on Math. 1942-46;
member NAS-NRC Com.in Math. Advisory to Director, Planning Div., Off. Naval Research
1947-

NRC (~~member~~; Com.on Sci.Personnel) (Fellow)

AAAS (Fellow; Vice-Pres. 1939); Amer.Acad.Arts and Sci.; AMS (Vice-Pres.1933-
35; Pres. 1941-42); Math.Asso.Amer.; Chmn. War Preparedness Com. of AMS and MAA
1940-42; Amer.Philos.Soc. 1936- ; Sigma Xi; Phi Beta Kappa; Delta Kappa Ep-
silon; Circolo Mat.di Palermo

AMS Colloquium Lecturer 1931

Joint winner Bocher Prize 1933

World War I - Croix de Guerre (silver star) divisional citation

" " II - Meritorious Service Award from Ordnance, 1944

War Policy Com. of War Manpower Commission, World War II

Positions held:

Harvard - Sheldon Fellowship (appointed 1917; resigned for War); Benjamin Peirce
Instr.Math. 1919-20; Asst.Prof. 1926-28; Asso.Prof. 1928-30;
Prof. 1930-35

Cornell - Instr. 1920-22; Asst.Prof. 1922-25

Brown - Asso.Prof. 1925-26

IAS - Prof. 1935-

US Army Ordnance Dept. - Techn.Expert Research and Development, World War II

THE INSTITUTE FOR ADVANCED STUDY
SCHOOL OF MATHEMATICS
PRINCETON, NEW JERSEY

March 25, 1948

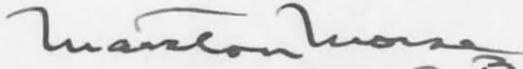
Dear Mrs. Leary:

It has been the understanding when a lecturer comes here under honorarium of \$100, if he stays here two or three days he is provided with room and board.

This affects now Professor Henri Cartan for whom a room has been reserved (to be charged to the Institute) at the Nassau Club from Monday evening, March 29, at least until Thursday morning, April 1.

The lecture has now been set for Wednesday, March 31, and I am sending a copy of this to Miss Trinterud with reference to the honorarium, and room and board expenses at the Nassau Club and at the Institute cafeteria if you approve.

Sincerely yours,


Marston Morse 9. 13

MM:GB