NATIONAL SCIENCE FOUNDATION
1800 G STREET, N.W.
WASHINGTON, D.C. 20550

OFFICE OF
INSPECTOR GENERAL

OIG Report: M89040003

I.
Introduction

This case involves [ ] (the "Principal Investigator" or "PI"), recipient of a Presidential Young Investigator award from the National Science Foundation (NSF). The PI was a professor in [ ] at [ ] (the "institution") from [ ] until [ ], when he moved to [ ]. The case also involves one of the PI's graduate students at the institution, [ ] (the "graduate student"), who left the United States in the Winter of 1988-1989. The allegations were brought by another professor at the institution, [ ] (the "other professor") and one of the other professor's graduate students, [ ] (the "other graduate student"). The case focuses on two papers, [

] (paper "G"), by the other professor and the other graduate student (the "authors of paper G"), and [

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(paper "H"[1]), by the PI and the graduate student, and the graduate student's dissertation (the "dissertation"). Paper G was submitted for publication in November 1986, and published in March 1988, while paper H was submitted in November 1987 and published in November 1988; the dissertation was formally orally defended on 16 November 1988. Paper H stated: "This paper is based upon work partly supported by the National Science Foundation under Grants No. [ ], [ ], [ ], and [ ]."

II.
The Institution's Actions

This case began with the receipt by this office on 11 April 1989 of a letter dated 6 April 1989 from the institution's dean of graduate studies. In that letter, the dean said the institution had completed "an initial inquiry and intend[ed] to conduct an investigation" into an allegation

[1]The papers will be referred to as "G" and "H" to match the terminology used in the institution's investigation committee report.

that paper H had plagiarized another paper.[2] On 14 February 1990, this office received a letter dated 13 February 1990 from the institution's new dean of graduate studies (the "dean"), which said:

> "The committee has now completed its investigation and . . . has determined that [paper H] plagiarized substantial portions of [paper G]. . . . The investigative committee also determined that [the graduate student]'s doctoral thesis plagiarized substantial portions of the same [paper G].
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> ". . . [The PI] is no longer an employee of [the institution]. . . . [The graduate student] did not receive a Ph.D. from [the institution]. To the best of our knowledge, he is now in his homeland of Taiwan.
>
> "Because [the PI and the graduate student] are all no longer at [the institution], we believe we have done all we can unilaterally to resolve this matter. . . ."[3]

Accompanying the dean's letter was the institution's investigation committee (the "committee")

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[2]It appears that the committee that conducted the inquiry was actually the graduate student's "final doctoral examination committee" (the "examination committee"), reconstituted of the members who had approved the graduate student's dissertation three months before — except that the PI, the graduate student's advisor, was excluded. (The dean had withdrawn her approval of the graduate student's dissertation before the examination committee began its formal inquiry.) The examination committee conducted a "preliminary, informal inquiry to determine whether further investigation was warranted." In the course of the inquiry, certain evidence was "reviewed and discussed" that was not provided to either the graduate student or the PI to review and rebut prior to the committee's decision. (Letter dated 13 February 1990 to the PI from the executive vice president of the institution; letter dated 9 March 1989 to the dean from the examination committee.) The examination committee then "voted to reject [the graduate student]'s dissertation by a vote of 3-1 (3 in favor of rejection, 1 against rejection)." (Letter dated 9 March 1989.)

[3]It appears from this language that the examination committee's previous rejection of the graduate student's dissertation (see note 2) had been considered by the institution to be final. Thus, it would seem that the institution imposed a sanction on the graduate student before the institution began its investigation, without providing the graduate student timely access to the evidence against him.

It is not at all clear from the record whether the institution complied with the due process requirements of the Fourteenth Amendment of the United States Constitution regarding the graduate student, which as a state entity it must. Although we find this to be troubling, it is not our province to review the sanctions imposed by institutions for acts of misconduct.

report (the "report"), which concluded:

> "(1) The dissertation written by [the graduate student] has plagiarized substantial parts of . . . paper G.
>
> "(2) The paper H, co-authored by [the graduate student] and [the PI], has plagiarized substantial parts of the . . . paper G."

The report was signed by the three members of the committee; appended to the report were "additional comments" by one of the committee's members, which concluded:

> "During my investigations of the plagiarism complaint, I did not observe any direct involvement of [the PI]. Transcripts of [the graduate student]'s telephone conversation [with the chairperson of the committee] indicate the same. However, [the PI] has not clearly explained his co-authorship in the paper H that has plagiarized substantial parts of . . . paper G."

Upon request, the institution provided to us background material regarding this matter, including a copy of the graduate student's dissertation. The PI also provided documents, including letters in which he set forth his version of the events.

III.
Evaluation of the Allegation

The institution's report did not resolve to our satisfaction the factual issues in this case. Furthermore, as quoted above, the institution stated that it had no further interest in the case because both the PI and the graduate student were no longer there. We therefore evaluated the issues independently, as discussed below, based on the materials provided by the institution and the PI.

A.
Plagiarism

Neither paper H nor the dissertation contains narrative text from paper G (submitted for publication in November 1986). However, as shown in the Appendix, virtually all of the equations in paper H (submitted for publication in November 1987) are identical or mathematically equivalent to equations in paper G, and all of the equations in paper H appear in the dissertation (defended in November 1988).

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B.
Paper H

There is no citation to paper G in paper H.[4]

Paper H is focused on the presentation of a method, which is presented via the "governing equations". The abstract at the beginning of paper H makes this clear:

> "A method is proposed here . . . . The . . . method is used . . . . The unique feature of the method is that it is extremely efficient . . . . The method can be used to study . . . . It is verified with experimental and numerical results available in the literature. The robustness of the algorithm is confirmed by applying it to analyze several problems of practical importance. The method is robust yet simple, accurate, and economical." (Paper H, at p. 69.)

An "Introduction" is followed by a section titled "Proposed methodology," which begins: "The . . . method proposed by [the other professor in an earlier paper than paper G] . . . has been extensively modified . . . ." (Paper H, at p. 70.) Paper H ends with a section titled "Summary and conclusions":

> "The governing equations . . . have been developed. Procedures . . . were also proposed. The . . . method is used . . . . The unique feature of the proposed method is that it is extremely efficient . . . .
>
> "The proposed method is verified with experimental and numerical results available in the literature. It is observed that the proposed method is very reliable and accurate . . . . The proposed method is extremely economical compared to other methods in terms of computer time required to solve a problem. The method is also applied to some problems with practical implications to show the robustness of the algorithm." (Paper H, at p. 89.)

C.
The Dissertation

The dissertation cites paper G, on pages 196 and 198, but only with regard to the solving of a particular example problem, not as the source of the method itself.[5]

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[4]Although paper G had been submitted (November 1986) but not yet published when paper H was submitted (November 1987), paper G had been published (March 1988) well before paper H was actually published (November 1988).

[5]Paper G is reference "(108)" in the dissertation. On page 196: "An . . . is analyzed
(continued...)

Most of the material that was published in paper H is contained in chapter 4 in the dissertation, which begins:

> "An algorithm is developed . . . using the assumed stress method described in Chapter 3. In this chapter, the same method is extensively modified . . . ." (Dissertation, at p. 86.)

The two substantive subchapters of this chapter both have titles that begin "Derivation of . . . ." (Dissertation, at pp. 86, 118.) Chapter 4 concludes:

> "In this chapter, detailed derivations . . . are made. An algorithm . . . is proposed. Several examples are given to show the accuracy and reliability of the proposed method . . . ." (Dissertation, at p. 132.)

The portion of the material from paper H that appears in chapter 5 of the dissertation is in two subchapters, the titles of both of which begin "Derivation of Governing Equations . . . ." (Dissertation, at pp. 135, 145.)

D.
Conclusion Regarding Plagiarism

The method that is the substance of paper H and the corresponding substantive portions of the dissertation — that is the ideas, as presented via the equations — are the same as paper G, and the focus of all three is the same: the presentation, via equations, of the method. Both the dissertation and paper H present the substantive material from paper G as original contributions of the PI and the graduate student, which it was not.

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[5](...continued)
here. . . . [The authors of paper G] (108) used the example to solve . . . problems." On page 198, with regard to the same example: "In this particular case, the responses . . . are quite different. However, these discrepancies were also observed by others (108). . . . The inability to verify this . . . case caused us to consider Case 2, which was also considered by [the authors of paper G] (108). . . . Both results are in complete agreement and justify the validity of the proposed method and verify the proposed algorithm."

IV.
Culpability

A.
The Graduate Student

The graduate student said:

> "I got a [pre-publication] copy of . . . paper [G] from [the other professor]'s secretary and I verify each equation. I didn't know where it was going to publish at that time. I discussed many times with [the other graduate student] about his paper and I tried to interpret each equation . . . . [The other graduate student] gave me a lot of help but he didn't give me his [computer] program. I develop . . . my . . . [computer] program by myself. It took me a lot of effort (about 10 months) to develop it. After finishing the . . . [computer] program I wrote a paper about what I did.[6] At that time I had a naive idea. I think if I have a little bit of new finding and different application . . . then I can publish a paper. That is a very serious mistake. I admit I didn't give [the authors of paper G] credit at that paper. I apologize to them.
>
> ". . . I didn't mention whole the situation to [the PI] until Dec. 9 1988. [The PI] also unaware of my contact with . . . [the other professor]. The same problem happened in my thesis. However, [paper G] was quoted in my bibliography because I knew where it was published. . . ." ("Memorandum" signed by the graduate student, marked received by the institution 3 January 1989, at p. 2.)

Both the graduate student and the PI seem to perceive this case as the mere omission of a citation. In one letter, the PI stated that the graduate student's

> "only mistake was an innocent failure to refer to [the] then-unpublished paper [G] . . . . However, [the graduate student]'s willingness to acknowledge his sources of information is demonstrated by the inclusion of three references to [the other professor]'s prior work on the topic in [paper H], and by his subsequent references to [paper G]." (Letter dated 11 April 1991 to this office from the PI, at p. 2.)

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[6]The paper being referred to is paper H, which, as discussed above, is about a method, not a computer program. The only reference to a computer program is the following: A computer program is developed to do all the operations described in this paper. This program is used to solve several problems as described in Section 4." (Paper H, at p. 81.) The focus of paper H is the method — the examples are presented only to provide "some verification" of "[t]he accuracy, efficiency, and versatility of the proposed method . . . ." (Paper H, at p. 82.)

We disagree. What has been presented in paper H, and the corresponding portions of the dissertation, is a method. That method, including virtually every equation in its development, was taken by the graduate student from a pre-publication copy of paper G. Even in the dissertation, the citations to paper G utterly failed to convey the extent of the contribution to the dissertation from that source.

The graduate student plagiarized paper G in paper H and his dissertation, which is misconduct in science under NSF's regulation.[7] However, the graduate student left the United States in the winter of 1988-1989 and remains outside of the United States. Given the fact that the graduate student has not received federal funding for more than three years and is not likely to apply for funding in this country in the future, we believe we should take no action against

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[7]45 C.F.R. § 689.1(a)(1). In response to a draft version of this Report, in the graduate student's defense the PI said that our conclusion

> "makes me wonder whether we are using the same definition of plagiarism. I have always defined plagiarism as deliberately taking the work of someone else and attempting to present it as one's own for purposes of personal gain (not necessarily financial gain). . . . If someone performs original work, and in the course of that work extends unpublished work with the permission and cooperation of the author, but omits that reference because of inexperience, does NSF consider him to be a plagiarist?" (Letter dated 24 February 1992 to this office from the PI, at p. 4.)

He also said:

> "No one can claim a copyright on a theory that is developed and available in the open literature. In my opinion, the only way one can keep a theory proprietary is by not publishing it. . . . [T]he point is that this was not plagiarism, but an innocent and relatively harmless mistake. [The authors of paper G] did not lose anything important because of it. There were no financial interests at stake, nor was there substantial prestige to be lost, since [paper G] appeared earlier in the literature than did [paper H]." (Letter dated 13 February 1992 to this office from the PI, at p. 9.)

NSF's prohibition of plagiarism in proposing, carrying out, or reporting results from activities funded by NSF, includes taking credit for words or ideas that are not one's own. Even if "[t]here were no financial interests at stake, nor was there substantial prestige to be lost," plagiarism is absolutely improper. On the other hand, if proper attribution is provided, then the words and ideas of others may be freely used. In this case, however, the substance of paper G — the ideas presented therein — is what was taken and presented, in paper H under the names of the PI and the graduate student, and in the dissertation under the graduate student's name. In our view this constitutes extensive plagiarism under NSF's definition of misconduct.

the graduate student in this matter.

B.
The Principal Investigator

As related above, the graduate student said that he did not mention to the PI that he had obtained a pre-publication copy of paper G until the PI asked him about it in December 1988, after the publication of paper H and approval of his dissertation. In a telephone conversation (after the graduate student had returned to Taiwan) with the chairperson of the committee, the graduate student insisted that the PI "is really innocent in this case",

> "so I really hope the whole case will stop there. Because I already left [the institution]. That means that I take full responsibility because I made mistakes because I didn't give them enough credit for the published paper. I think if anyone else shouldn't take any responsibility." (Transcript dated 10 August 1989, at p. 18.)

The PI also said that he was unaware of paper G until he learned of the other professor's allegations in December 1988. (E.g., letter dated 27 June 1989, at pp. 12-14.) There is no contrary evidence in the record.[8]

In a letter to the institution, the PI discussed their preparation of paper H:

> "Let me explain how [the graduate student] and I worked at [the institution]. First, [the graduate student] would come up with a very rough version of a paper, including equations and figures. He would then give it to me

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[8]The other professor alleged that the PI must have known about paper G before he submitted paper H for publication, because the other professor had given a talk at a conference that the PI had attended, and the paper written by the other professor that was published in the proceedings of that conference cited paper G as "to appear". (Letter dated 20 July 1989 to the chairperson of the committee from the other professor, at 2.) We have concluded to the contrary: it is clear from the evidence that the PI did not attend the other professor's talk at the conference, and the volume of the published proceedings (there were four altogether) that he obtained did not contain the other professor's paper. (Letter dated 9 October 1989 to the chairperson of the committee from the PI, at pp. 5-6.)

As explained above, the graduate student had not cited paper G in paper H; it had not yet been published when paper H was written and submitted for publication (although the graduate student had obtained a pre-publication copy before he began his work). The graduate student cited paper G in the dissertation, but, as explained above, only with regard to one of the examples: In these circumstances, we do not believe the PI can be faulted for not having checked each of the 142 references in his graduate student's dissertation.

for my opinion. I would take several weeks to look into the paper in detail, derive some of the equations in case of any doubt or discuss my concerns with [the graduate student], and critically look at all the figures. Once I was satisfied, [the graduate student] and I would sit down together and rewrite the whole paper sentence by sentence. This rewriting process generally took several days.

". . . I did not help [the graduate student] with the derivation of the equations, one by one, in [paper H]. However, by reviewing and criticizing his work and asking for explanation and checking his work and by comparing the examples with other works available on the subject, I perfected the work, and thus indirectly helped him derive the equations." (Letter dated 9 October 1989, at p. 10.)

The PI's assertion that he had gone over each of the equations in paper H with the graduate student, is consistent with the substantive differences we observed, as shown in the Appendix to this Report, between some of the equations in paper G and the corresponding equations in paper H. We asked the PI to explain the differences, which he did in a letter dated 11 April 1991. He said that the differences in signs in paper H's equations 34, 35, 40, 46, 53, 54, A.6, and A.9 are due to sign conventions — the corresponding equations in papers G and H are correct and internally consistent. The equations in paper G that correspond to paper H's equations 38 and 39 are in error. (Letter dated 11 April 1991, at p. 14.) The PI's explanation was verified by an NSF expert in this field.[9]

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[9]The differences in the equations in paper H and paper G, and particularly the correction in paper H of errors in paper G, are consistent with the active supervisory review that both the graduate student and the PI contend that the PI engaged in. In response to a draft version of this Report and an inquiry from us, the PI further explained that

"the evaluation of the equations was a collaborative effort between [the graduate student] and me. This took place in the Fall of 1987, and at this point it is impossible to remember precisely what was done by whom. . . . We both carried out our responsibilities in full, except that he did not tell me about the existence of the [paper G] manuscript. . . . Again, it was [the graduate student]'s responsibility as my student to perform the work, and my responsibility as his advisor to determine direction and scope of his work, assess the quality of his work, and make recommendations for improvements. . . . I was completely unaware of the existence of the [paper G] manuscript until December 9, 1988. This is not because I did not provide adequate supervision, but because there is no humanly possible way for me to detect the existence of an unpublished manuscript. I do not have the power to read minds." (Letter dated 24 February 1992 to this office from the PI, at pp. 2-4.)

(continued...)

We conclude that the PI was unaware of the plagiarism of paper G, and we have no basis on this record to assert that he should have become suspicious in the course of his routine interactions with the graduate student in preparing the work for publication.[10]

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[9](...continued)
With these additional explanations provided by the PI, we believe — contrary to the additional comments appended to the institution's report by one of the institution's committee's members — that the PI *has* "adequately explained his co-authorship in the paper H that has plagiarized substantial parts of . . . paper G."

[10]The PI has argued at great length to the effect that there can be no plagiarism if there was no genuine profundity to the copied work. For example, the PI stated in a letter to the institution that "we did not refer to the paper" G because "the information in this paper did not originate with" the authors, "and all of it was originally authored by other researchers." (Letter dated 27 June 1989, at p. 23.) In response to a specific request by the committee for a reference to support this statement, the PI replied: "In this comment, if I understand it correctly, the committee thinks that [the authors of paper G] were the first to solve . . . . As I pointed out earlier, there is no uniqueness . . . . This is an obvious extension . . . ." (Letter dated 9 October 1989, at p. 11.) In a letter to us, the PI continued his assertions that there was nothing in paper G worth copying:

> "But, although extending the . . . equations . . . is a simple, obvious procedure, there are no alternatives to this one procedure. Thus, from a conceptual point of view, no new theory is required to develop the . . . methodology . . . . There is no alternative to this procedure. . . . [The authors of paper G] did not contribute any significant theory in [paper G]." (Letter dated 11 April 1991, at pp. 6-10.)

We are extremely troubled by these assertions by the PI, which seem to reflect a fundamental lack of understanding of the seriousness of the plagiarism that was committed in this case by a graduate student in the PI's charge. Regardless of whether the graduate student was capable of doing the work himself, the fact is that in this case he did not: instead, the graduate student obtained a pre-publication copy of paper G, took what those authors had done, and put his name on it. That is plagiarism, which is misconduct in science under NSF's regulation.

We also note, with regard to the PI's denigration of the significance of the method presented in paper G, that he apparently thought it sufficiently important to submit it for publication himself, in which paper he said the previous method in the literature had been "extensively modified", and he touted the method there presented as being "extremely efficient" and "robust yet simple, accurate, and economical."

V.
Conclusion

Paper H and the dissertation plagiarized virtually all of the substantive material in paper G. The graduate student was responsible for this plagiarism, but because he has been outside of the United States and has not received federal funding for more than three years and is not likely to apply for funding in this country in the future, we believe we should take no action against the graduate student in this matter. The PI did not engage in misconduct in science under NSF's regulation.

[redacted]
Assistant Counsel to the Inspector General
30 March 1992

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Appendix

Comparison of Equations in Paper G, the Dissertation, and Paper H

Paper G	Dissertation	Paper H	Substantive differences (G → Dissertation/H)
(1)	(4.1)	(1)	
(5)	(4.2)	(1.a)	
	(4.3)	(2)	
(7)	(4.4)	(2.a)	
	(4.5)	(3)	
(6)	(4.6)	(4)	
(10)	(4.7)	(5)	
(9)	(4.8)	(6)	
(14)	(4.10)	(7)	
	(4.14)	(8)	
	(4.15)	(9)	
(18)	(4.16)	(10)	
(18)	(4.17)	(11)	
(18)	(4.18)	(12)	
	(4.19)	(13)	
	(4.20)	(14)	
(20)	(4.21)	(15)	
	(4.22)	(16)	
(21)	(4.23)	(17)	
	(4.24)	(18)	
(23)	(4.25)	(19)	
	(4.26)	(20)	
	(4.27)	(21)	
(22)	(4.28)	(22)	
(22a)	(4.29)	(23)	
(23a)	(4.30)	(24)	
(25)	(4.31)	(25)	
(27)	(4.33)	(26)	
(28)	(4.34)	(27)	
(36)	(4.37)	(28)	
(37)	(4.38)	(29)	
(37)	(4.39)	(30)	
(40)	(4.42)	(31)	
(41)	(4.43)	(32)	
(42)	(4.44)	(33)	

Paper G	Dissertation	Paper H	Substantive differences (G → Dissertation/H)
(43)	(4.45)	(34)	Signs of the right-hand terms are reversed
(44)	(4.46)	(35)	Signs of the right-hand terms are reversed
(49)	(4.47)	(36)	
(50)	(4.48)	(37)	
(51)	(4.49)	(38)	$+dM_{p2} \rightarrow -dM_{p3}$
(52)	(4.50)	(39)	$dM_{p3} \rightarrow dM_{p2}$
(56)	(4.51)	(40)	F is on other side of equation
(55)	(4.52)	(41)	
(53)	(4.53)	(42)	
(54)	(4.54)	(43)	
(57)	(4.55)	(44)	
(59)	(4.56)	(45)	
(60)	(4.57)	(46)	Where H(34) and H(35) have reversed signs compared to G(43) and G(44), the terms associated with them are reversed in H(46) also; H(46) omits the terms associated with H(36) and H(37) "since their contribution is expected to be negligible," citing an earlier paper than paper G by the other professor.
(68)	(5.1, 5.30)	(47)	
(69)	(5.31)	(48)	
(72)	(5.5)	(49)	
(73)	(5.6)	(50)	
(74)	(5.7, 5.33)	(51)	
(75)	(5.8, 5.34)	(52)	
(76)	(5.35)	(53)	Signs of the right-hand terms are reversed
(77)	(5.36)	(54)	Signs of the right-hand terms are reversed
(62)	(4.35)	(A.1)	
(63)	(4.40)	(A.2)	
(64)	(4.36)	(A.3)	
(65)	(4.41)	(A.4)	
(66)	(4.58)	(A.5)	
(61)	(4.59)	(A.6)	Signs of 3d, 4th, 5th, & 6th terms on right side are reversed
(67)	(4.60)	(A.7)	
(A1)	(4.61)	(A.8)	
(p.609)	(pp.108-9)	(p.91)	In A_{21} and A_{22} the signs for the second terms are reversed
(A3)	(4.64)	(A.11)	
(A11)	(4.72)	(A.16)	

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