INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

VIENNA I, KAERNTNERRING, AUSTRIA
TELEPHONE: 52 45 25, CABLE: INATOM

S/283-2

15 July 1966

Dear Dr. Varma,

Re: Mss 265 and 266.

Enclosed are the reviews of your papers "Approximate equations for plasmas in mirror machines" (ms 265), by Marshall N. Rosenbluth, Ram K. Varma; and "Flute instability in mirror machines at very low densities" (ms 266), by Ram K. Varma. The two papers were separately reviewed in different countries.

The writing of theses and the writing of your journal articles are not identical. In the review of ms 265 it is implicit that straightforward algebraic work need not be set forth, that the methods and the results suffice. The reviewer of ms 266 did not object to the length. Mr. Rosenbluth has told me that it would be a shame to truncate these clearly written works and sacrifice some of their intelligibility, but he admits he is not an impartial judge.

I am returning the manuscripts to you as printed matter for consideration, and for rewriting. Let us keep the introductions; perhaps they are at too low a level but I believe more papers would be easily understood if they had such a nice preparation for what follows. The general method should remain. Could you go through one or a few cases in detail and merely state the results for the remainder? Where only standard manipulations are required, is there any loss in stating only the special conditions (or parameters) for the case and showing the result?

In addition you will see that I am not happy about the text of ms 265. I have marked the first 20 pages for typists' errors, for grammar, for style. The written language and the laboratory spoken language are not identical, and my notion of style is that laboratory jargon should not appear in print. Journal style, as expounded in the Style Manual of the American Institute of Physics, requires that all symbols be identified. Most of your symbols are defined but not all. (Disregard my marks in the equations; they are for the type-setter and not for the author.)

From the evidences of your recasting parts of the articles, I imagine you wish you did not have to see them again. I hope that you agree with me that conciseness will improve them and make them more readable and thus more useful to workers in nuclear fusion research.

Sincerely,

Herbert Pomerance

Herbert Pomerance
Editor, NUCLEAR FUSION

Encl.

Dr. Ram K. Varma
NASA, Langley Research Center -
Mail Stop 160
Langley Station
Hampton, Virginia, 23365
U.S.A.

cc: US Mission to the IAEA.

Ms 265

N U C L E A R F U S I O N

International Atomic Energy Agency

Kaerntner Ring 11 Vienna I Austria

Authors: Marshall N. Rosenbluth and Ram K. Varma

Title: "Approximate equations for plasmas in mirror machines"

Reviewer: [redacted]

We would like to have your comments on this manuscript (in duplicate), even though brief, within four weeks. If you are unable to review it we will be glad to have you hand it on to a colleague who can review it adequately, or to send it back to us perhaps with the suggestion of another reviewer. If this review sheet is not proper for your needs, use the back side or use additional sheets that are anonymous. Consider the following questions.

a) Is NUCLEAR FUSION the appropriate journal? Which other journal? Yes

b) Is the manuscript suitable for publication in NUCLEAR FUSION? Not in present form

c) Have you any suggestions for improvement or clarification? Yes.

d) Is the title adequate? Yes, but it would be perhaps worthwhile to stress that it is taking into account correctly the effects of the inhomogeniety of the magnetic fields which is the new feature

e) Is the abstract (which we will print in four languages) an adequate summary?

Yes.

f) Does the paper contain new material? Is it a review?

Some new meterial but a lot of unnecessary hack work is recorded

g) Does the author consider sufficiently the published literature?

Yes

h) Remarks.

Too long.

Comments on Ms. 265, "Approximate equations for plasmas in mirror machines"
by M. N. Rosenbluth and R. K. Varma

1. Introduction is interesting but contains little new material.

2. Section 2 is not new, so it seems sufficient to give final resultsonly.

3. Section 2, part 3. The transformations are basically simple, (algebraically complicated) so only final results, eqn. (II.42) is necessary with a little explanation of symbols.

   The method of solution discussed between eqns. (II.44) and (II.50) needs shortening - it is not a new method.

4. The main point about the paper, namely the various orderings that are made and then solutions obtained is probably best discussed by treating each ordering separately in the section where the mathematics is done, rather than all together in the first section. Of course a resume is necessary in the first section.

5. Equations (III.1a (III.7). Only (III.4) necessary.

6. The proof that $E_{\parallel}$ may be dropped in the first ordering scheme is important (p.48).

7. It seems to me that it is only necessary to indicate how to get III.67 without giving gruesome details. After all some algebra is already left out.

8. Section 3, starting on page 62, is important leading up to equation III.98. However, the write up is cumbersome. The discussion on p.73 gives some interesting results.

9. Section IV. gives a derivation of the Northrop-Teller equation from 1st principles. This is new but the proof looks very long winded. Some of the details not needed.

MS 266

N U C L E A R F U S I O N

International Atomic Energy Agency

Kaerntner Ring 11 Vienna I Austria

Authors: Ram K. Varma

Title: "Flute instability in mirror machines at very low densities"

Reviewer:

We would like to have your comments on this manuscript (in duplicate), even though brief, within four weeks. If you are unable to review it we will be glad to have you hand it on to a colleague who can review it adequately, or to send it back to us perhaps with the suggestion of another reviewer. If this review sheet is not proper for your needs, use the back side or use additional sheets that are anonymous. Consider the following questions.

a) Is NUCLEAR FUSION the appropriate journal? Which other journal?

Yes

b) Is the manuscript suitable for publication in NUCLEAR FUSION?

Yes

c) Have you any suggestions for improvement or clarification?

No substantial suggestions

d) Is the title adequate? Yes

e) Is the abstract (which we will print in four languages) an adequate summary?

The abstract gives a notion of the work

f) Does the paper contain new material? Is it a review?

The paper contains new material

g) Does the author consider sufficiently the published literature?

Comparison is lacking with the works of B.B. Kadomtsev: Zh.eksp.teor.Fiz. 40 (1961) 328; Nuclear Fusion 1 (1961) 286.

h) Remarks.

REVIEW

of the article by Ram K. Varma, entitled "Flute instability in mirror machines at very low densities".

As a rule, when discussing the stability of a dilute plasma in a magnetic field, its inhomogeneity was modelled by introducing gravity. The author does not use this simplification; consequently, he arrives at a new oscillation branch that is associated with changes of diamagnetic drift velocity in the wave. The author assumes that oscillations with a frequency independent of density, which are observed in adiabatic traps, are associated with the excitation of this branch. The results are of doubtless interest.

A considerable portion of the work is devoted to determining the critical area at which the buildup of flute oscillations originates. This question was discussed by a number of authors. The author of the present work succeeded in investigating models similar to real models by using the variation principle he had developed. In this connection comparison with experiment would be desirable.

(Non-fundamental) comments on the article:

1) the choice of the perturbed-potential dependence presupposes the system to be unbounded along the magnetci field. It would be desirable to know to what degree this assumption is substantial.

2) the article lacks comparison with the works of B.B. Kadomtsev Zh.eksp.teor.Fiz. 40 (1961) 328; Nuclear Fusion 1 (1961) 286.

August 24, 1966

Dear Marshall,

I am extremely sorry not to have replied to your letter sooner. But about two weeks after I received your letter, I also received the manuscripts from the editor of Nuclear Fusion for shortening. He recommended that I leave the introductions of the papers as they are, and try to cut short some of the algebra. So I did. It was difficult to cut the algebra too short, so the revised version of the first paper is only about 10 pages shorter, and that of the second one only about 5 pages. More shortening could have been effected by curtailing some of the introductions.

I also had some more work resulting from the corrections that the editor made "for grammar and for style, etc." For instance he substituted phrases like " . . . gravity drift is two orders higher compared to electric field drift . . . " by " . . . gravity drift is two orders of magnitude greater compared to electric field drift . . ." Anyway, I have recorrected them and sent them back.

I am glad to hear that you had a good year at Trieste. I also enjoyed my stay at Langley. I shall be returning to India in the first week of November, and would like to see you in Trieste if you will still be there.

With deep regards,

Sincerely yours,

Ram

Ram K. Varma

FLUGPOST
AIR MAIL
PAR AVION

WIEN 1
15.7.66

I A E A
INTERNATIONAL
ATOMIC ENERGY AGENCY
KAERNTNERRING 11
A 1010 VIENNA, AUSTRIA

ÖSTERREICH
•900
GROSCHEN

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

VIENNA I, KAERNTNERRING, AUSTRIA
TELEPHONE: 52 45 25, CABLE: INATOM

Dr. Ram K. VARMA
NASA, Langley Research Center -
Mail Stop 160
Langley Station
HAMPTON, Virginia, 23365
U. S. A.

NUCLEAR FUSION
INTERNATIONAL ATOMIC ENERGY AGENCY
KAERNTNER RING 11, VIENNA I, AUSTRIA

Re: Ms 265 30 August 1966

Dear Sir,

The paper entitled

"Approximate equations for plasmas in mirror machines"

by Marshall N. Rosenbluth, Ram K. Varma

has been accepted for publication in vol. 7 no. 1

Sincerely,

Herbert Pomerance, Editor

NUCLEAR FUSION
INTERNATIONAL ATOMIC ENERGY AGENCY
KAERNTNER RING 11, VIENNA I, AUSTRIA

Re: Ms 266 30 August 1966

Dear Sir,

The paper entitled

"Flute instability in mirror machines at very low densities,"

by Ram K. Varma

has been accepted for publication in vol. . 7. . no . . . 1. .

Sincerely,

Herbert Pomerance, Editor

L-31 (Oct 65)

Dr. Ram K. VARMA
NASA, Langley Research Center -
,ail Stop 160
Langley Station
HAMPTON, Vieginia, 23365
U. S. A.

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

VIENNA I, KAERNTNERRING, AUSTRIA
TELEPHONE: 52 45 25, CABLE: INATOM

WIEN 1
30.8.66

I A E A
INTERNATIONAL
ATOMIC ENERGY AGENCY
KAERNTNERRING 11
A 1010 VIENNA, AUSTRIA

ÖSTERREICH
•60
GROSCHEN

FLUGPOST
AIR MAIL
PAR AVION

Dr. Ram K. VARMA
NASA, Langley Research Center -
Mail Stop 160
Langley Station
HAMPTON, Virginia, 23365
U. S. A.