The reflection of a blast wave by a very intense explosion

Andrew W. Cook, Joseph D. Bauer and Gregory D. Spriggs

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Original submission: 19 February 2021
Revised submission: 30 April 2021
Final acceptance: 5 May 2021

Note: Reports are unedited and appear as submitted by the referee. The review history appears in chronological order.

Review History
RSPA-2021-0154.R0 (Original submission)

Review form: Referee 1

Is the manuscript an original and important contribution to its field?
Acceptable

Is the paper of sufficient general interest?
Acceptable

Is the overall quality of the paper suitable?
Excellent

Can the paper be shortened without overall detriment to the main message?
Yes

Do you think some of the material would be more appropriate as an electronic appendix?
No

Do you have any ethical concerns with this paper?
No

Recommendation?
Accept as is
Comments to the Author(s)
The manuscript does a good job of describing the problem and its solution. It does not seem surprising that the reflection from an ideal, frictionless surface would yield a nearly universal solution, since the reflected wave exactly corresponds to an identical, second blast wave. Only if baroclinic vorticity or other nonlinear effects are large would the reflection not be nearly self-similar.

If the lower atmosphere was strongly stratified, either naturally or by the popcorn effect from the blast radiation, the results might be a little different.

Review form: Referee 2

Is the manuscript an original and important contribution to its field?
Excellent

Is the paper of sufficient general interest?
Good

Is the overall quality of the paper suitable?
Excellent

Can the paper be shortened without overall detriment to the main message?
Yes

Do you have any ethical concerns with this paper?
No

Recommendation?
Accept with minor revision (please list in comments)

Comments to the Author(s)
p. 1: The authors state that in 14 events the blast wave interacted with the ground to alter the rate of expansion of the fireball. I believe the actual number from the US testing program is much higher (~39 events), based on the scaled height of burst of these events. I suggest changing the wording to "... in at least 14 of these events ..."

Reference 11, which (I believe) is critical to laying a concrete example of the practical importance of this work, is not generally available. Could it be provided as an electronic appendix?

p. 4: The author's state that "the blast gradually transforms from a sphere into a hemisphere ...". I was thinking about the Grable event, in which the reflected shock flattens the bottom portion of the fireball and it does not form into a hemisphere. But then I thought that perhaps the author's are thinking about the shock front itself (as opposed to the fireball front) as the "blast" and then it is that portion that forms into a hemisphere. If that is the case, perhaps a simple clarifying statement that by "blast" they mean the shock front. (?)

Equation (2.6): It is certainly obvious that this equation is applicable in the case of a surface burst, but less obvious to me that this equation should also be applicable in the general case of a detonation at any arbitrary height of burst. Perhaps the key is in the phrase "long-term limit", as stated. It could certainly be stated as an ansatz and the rest follows as presented.
Decision letter (RSPA-2021-0154.R0)

28-Apr-2021

Dear Dr Cook,

On behalf of the Editor, I am pleased to inform you that your Manuscript RSPA-2021-0154 entitled "The Reflection of a Blast Wave by a Very Intense Explosion I. Scaling and Similarity" has been accepted for publication subject to minor revisions in Proceedings A. Please find the referees' comments below.

The reviewer(s) have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript. Please note that we have a strict upper limit of 28 pages for each paper. Please endeavour to incorporate any revisions while keeping the paper within journal limits. Please note that page charges are made on all papers longer than 20 pages. If you cannot pay these charges you must reduce your paper to 20 pages before submitting your revision. Your paper has been ESTIMATED to be 11 pages. We cannot proceed with typesetting your paper without your agreement to meet page charges in full should the paper exceed 20 pages when typeset. If you have any questions, please do get in touch.

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Once again, thank you for submitting your manuscript to Proceedings A and I look forward to receiving your revision. If you have any questions at all, please do not hesitate to get in touch.

Best wishes
Raminder Shergill
proceedingsa@royalsociety.org
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Reviewer(s)' Comments to Author:

Referee: 1

Comments to the Author(s)
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Referee: 2

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Decision letter (RSPA-2021-0154.R1)

05-May-2021

Dear Dr Cook

I am pleased to inform you that your manuscript entitled "The Reflection of a Blast Wave by a Very Intense Explosion" has been accepted in its final form for publication in Proceedings A.

Our Production Office will be in contact with you in due course. You can expect to receive a proof of your article soon. Please contact the office to let us know if you are likely to be away from e-mail in the near future. If you do not notify us and comments are not received within 5 days of sending the proof, we may publish the paper as it stands.
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On behalf of the Editor of Proceedings A, we look forward to your continued contributions to the Journal.

Sincerely,
Raminder Shergill
proceedingsa@royalsociety.org