Journal of Fluid Mechanics - Editorial decision - JFM-21-S-0408

Journal of Fluid Mechanics <onbehalfof@manuscriptcentral.com>

Mon 12/07/2021 13:52

To: Alexander Bradley - UKRI BAS <aleey@bas.ac.uk>

2 attachments (245 KB)

Attached standard file: Reviewer 3.pdf; Attached standard file: Reviewer 2.pdf;

12-Jul-2021

Dear Dr. Bradley

JFM-21-S-0408
Asymptotic Analysis of Subglacial Plumes in Stratified Environment
Bradley, Alexander; Williams, C.; Jenkins, Adrian; Arthern, Robert

Your paper has been refereed and the comments of the referees are included at the bottom of this letter. As you will read, Referees 1 and 2 believe that the manuscript is not suitable for publication in the Journal of Fluid Mechanics because: i) the research picture is not clear to the extent that following the discussion is very difficult for a reader not conducting research with this specific geometry/setting; ii) more importantly, it does not investigate novel fluid mechanics. Although Referee 3 has positive comments about your manuscript, Referees 1 and 2 concerns are too serious to be overcome. Hence, I am sorry to have to inform you that your paper is not suitable for publication in the Journal of Fluid Mechanics. Referee 1 suggests that your manuscript may be more suitable in an applied mathematical Journal.

Yours sincerely,

Dr. Claudia Cenedese
Journal of Fluid Mechanics

Reviewer(s)' Comments to Author:

Referee: 1

Comments to the Author
The paper provides an asymptotic or approximate analytical solution to the plume equations. The solutions are tested by comparison with full numerical solutions of the same equations. This is not really fluid mechanics, but applied mathematics, so an applied maths journal would be a better destination for this work.

A concern is the use of the constant entrainment value 0.01 * slope : is there no Ri dependence of the entrainment for this problem. Other work suggests there may be some Ri dependence of the entrainment in sloping gravity currents / plumes ? (eg turner - see his book; and see cenedese and adduce and others)

In practice these flows are stratified in the cross-slope direction and the implicit assumption of the present model is that this stratification has the same structure along the ice so that the turbulent

transport parameters remain fixed -- it is not clear this applies in the case that the ice has sinusoidal fluctuations in slope or when it crosses the pyncocline (there may be some internal mixing and readjustment of the flow some distance downstream as it goes through either of these types of feature) -- but such re-adjustment is not accounted for in the model) -- what assurance is there that the model predictions (numerical or analytic) are correct / accurate downstream of such regions ?

Is there any experimental or field data which the model can be compared with to test the parameterisations and the effects of variations in slope or a pycnocline (even a simplified problem) -- for example, is it clear that there is no detrainment of fluid from the outer part of the plume as it moves through the pycnocline ?

The model seems to be one-dimensional - how accurate is this in terms of the melting parameterisation - do fluctuations cross-shelf impact the evolution of the plume ?

Referee: 2

Comments to the Author
See attached.

Referee: 3

Comments to the Author
See attached.