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Date: Jul 14, 2014
To: "Jean C Ragusa" jean.ragusa@tamu.edu,jean.ragusa@gmail.com
From: "Journal of Computational Physics" jcp@elsevier.com
Subject: JCOMP-D-13-00928

Re: JCOMP-D-13-00928

Dear Dr. Ragusa,

The Editorial Office has received the decision on the paper entitled "Discontinuous Finite Element Solution of the Radiation Diffusion Equation on Arbitrary Polygonal Meshes and Locally Adapted Quadrilateral Grids".

The reviewers' comments are as follows:

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Reviewer #1: This paper is a very high quality paper for the Journal of Computational Physics and should be accepted for publication without reservation. One of the main strengths of this paper is its very thorough review of spatial discretization technology for radiation diffusion. It is well written, and includes a comprehensive set of test problems applied to the new discretization proposed.

I have some suggestions for improvement, but as a reviewer, I do not require these additions to the paper for publication.

1. The derivation of the discretization is complicated enough to warrant an appendix which goes through the details of the mathematics (e.g. how to get to Eq. 3 and Eq. 8), like one would find in a thesis or dissertation. I am a proponent of including these detailed types of explanations in papers because I think they enhance the read-ability of the paper; however, some disagree with this philosophy.
2. On the list or prior works, a reference or references should be included for each item in the list. For the first two items, no references are included.
3. The author could state more clearly how this work is distinct from previous work. The author mentions that others have applied a Discontinuous method to diffusion operators. How is the proposed method different? In section 3, the author writes: "Many variants of such discontinuous discretization methods exist for diffusion problems…" It may be a good idea to say, the discretization in this paper is different because…
4. I am curious as to why the statement was made that "we have opted to use two loops: one over the elements…" Did this have an impact of computational performance? It seems like the reason why was never addressed.
5. For the discussion at the top of page 9 about C and h _|_ a picture may be helpful, especially when describing the inradius and circumradius for polygons.
6. I am curious if the author has tried standard linear basis functions (u(x,y) = a + bx + cy) on quadrilaterals to see if this works for the DFEM type diffusion discretization.
7. What code was this method implemented in? Was it just a test code? Was it MATLAB? Were there any parallel runs? What linear solver package was used, if any?
8. I think a potential weakness of the paper is that the author does not compare the new method to any of the existing methods. If this is not hard to do, these results would be very interesting to include in the paper. Additionally, these results could be included in a future paper or conference proceedings.
9. For the linear test problem results, what are the iteration counts for the linear solve as the mesh is distorted? Was the iteration count a lot different for the different mesh types? For quads vs. polygons?
10. A reference for computing bounded Voronoi diagrams is a good idea.
11. For the convergence plots, I think the terminology is a bit inconsistent. In the text the author writes in terms of dof. In the plots, he uses number of unknowns. This could be a bit more consistent, but is a minor detail.
12. In general, an understanding of how resistant this method is to negative solutions would be another interesting thing to study, especially in a time dependent case, with a delta-function like source. I would

anticipate that this method would perform a lot better than the CFEMs.
13. Does the author anticipate a straight-forward application to RZ geometry and 3D geometry? Will the method recover spherical symmetry in RZ geometry. Brunner, et. Al. have observed an issue with this for RZ geometry. See T.A. Brunner..., "Perserving Spherical Symmetry in Axisymmetric Coordinates for Diffusion," in Proc. International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering, May 5-9, 2013, Sun Valley, ID (2013), CD-ROM
14. I look forward to a follow on paper about using this for DSA acceleration

Reviewer #2: see attached file

NOTE: Additional comments by the reviewers may be available in Elsevier Editorial System (EES). You can find these comments in EES by clicking on "view review attachments". Please contact jcp@elsevier.com if you have any problems opening the reviewer comments in EES.
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In view of these comments made the Associate Editor who guided your article, Professor William R. Martin, has decided that the paper can be reconsidered for publication after minor revisions. Therefore we look forward to receiving the revised version of the paper together with a reply to the reports and a summary of the revisions made.

If the revised version is submitted within one month of receipt of this e-mail, the manuscript will retain the original submission date.

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When submitting your revised paper, we ask that you include the following items:

Response to Reviewers (mandatory)

This should be a separate file labeled "Response to Reviewers" that carefully addresses, point-by-point, the issues raised in the comments appended below. You should also include a suitable rebuttal to any specific request for change that you have not made. Mention the page, paragraph, and line number of any revisions that are made.

Manuscript and Figure Source Files (mandatory)

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Graphical Abstracts should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership online. Refer to the following website for more information:
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The revised version of your submission is due by Oct 12, 2014.

Yours sincerely,

Soniya Deepak
on behalf of the Editors of Journal of Computational Physics

Editorial-Production Department,
Elsevier
E-mail: jcp@elsevier.com

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