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Interactive comment on "Two-dimensional numerical investigations on the termination of bilinear flow in fractures" *by* A. E. Ortiz R. et al.

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"The paper by Ortiz et al. is a well-written paper that addresses an important topic in production and geothermal studies. It does not, however, provide substantial original work. The conclusions are supported by the numerical experiments and the general results are well presented. There are some minor issues with the current version that the authors may want to address in a final version of their article (below). I recommend minor revisions only."

1) "Section 2.1 would benefit from a simple figure explaining the geometry and conceptual background of the problem"

reply: The first paragraph of section 2.1 will use explicit cross-references to Fig. 1a

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that will be extended and improved for this purpose.

2) “Section 3: While the numerical solutions of the coupled equations are relatively simple, I think the authors should present a benchmark of their numerical scheme. Some information on the actual numerical technique will also be useful”.

reply: The dimensionless solution of Cinco-Ley and Samaniego-V. (1981) for the bilinear flow period (grey line in Fig. 2a;, 1981) constitutes a benchmark as does the value of 0.5 for the logarithmic derivative of radial flow that is in correspondence with analytical solutions (Fig. 2b and corresponding text; Bourdet, 2002). We will emphasize this agreement with benchmarks in section 3.1. We are happy to extend the description of the numerical technique presented in section 2.2 by adding names of the numerical program and solvers as well as information on the numerical element type, element number, and time steps.

3) “Figure 3 is not well explained either in the text or in the caption. If the paper needs the figure, it also needs some description.”

reply: The presentation of the resultant two-dimensional pressure field in examples is crucial from our point of view even though we subsequently succeed in finding fairly simple descriptors of its properties. We will therefore improve the description of this figure in the text to better justify its presentation.

4) “I particularly liked the discussion section.”

reply: Thanks!

5) “My main concern is that this paper, in its current version, is very specific, and does not address a question of wide interest for the solid Earth community. I’d encourage the authors to reformulate the introduction and implications to make it more appealing to the larger SE audience. This could be done e.g. by rethinking the implications, addressing the numerical problem in more detail, or a combination of them.”

reply: Thanks to the reviewer for expressing his opinion and thus challenging us. We

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will work on showing the relevance beyond borehole testing by extending the discussion. In fact our results suggest that pressure diffusion obeys a scaling different from the traditionally used “hydraulic diffusivity $\sim$ characteristic length scale squared / characteristic time” (D_hyd $\sim$ Lˆ2/t) when a prominent two-dimensional hydraulic conduit (e.g., fault) is present. The scaling relation becomes “D_bilin$\sim$Lˆ4/t” and may for example apply to aftershock activity and induced seismicity during reservoir stimulation.

Interactive comment on Solid Earth Discuss., 5, 391, 2013.