

Interactive comment on “Rupture-dependent breakdown energy in fault models with thermo-hydro-mechanical processes” by Valère Lambert and Nadia Lapusta

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Received and published: 4 August 2020

We would like to kindly call the attention of the authors to some recent literature that appears to be directly relevant to their preprint.

The two recent papers: “The emergence of crack-like behavior of frictional rupture: The origin of stress drops”, *Physical Review X* 9, 041043 (2019) [<https://doi.org/10.1103/PhysRevX.9.041043>] and “The emergence of crack-like behavior of frictional rupture: Edge singularity and energy balance”, *Earth and Planetary Science Letters* 531, 115978 (2020) [<https://doi.org/10.1016/j.epsl.2019.115978>] extensively discuss the analogy between frictional rupture and ideal cracks, which is also

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central to the authors’ preprint. In particular, the latter paper extensively discusses the relations between the breakdown energy and the edge-localized fracture energy (and the associated length scales). It is found, for generic rate-and-state constitutive relations, that (i) part of the breakdown energy can be identified with a well-defined edge-localized fracture energy, which depends on the constitutive relation, that is balanced by the elastic energy flux associated with the edge singularity and that determines the rupture speed. (ii) The breakdown energy can significantly exceed the edge-localized fracture energy, a deviation that is associated with the intrinsic rate-dependence of friction and the lack of strict length scales separation (iii) The breakdown energy is position dependent, even for the very same earthquake rupture propagating along a spatially homogeneous fault.

These findings seem to be directly relevant for the authors’ preprint.

We hope the authors find these comments useful for improving their preprint.

All the very best,

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-115>, 2020.

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