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Nonlinear Processes in Geophysics
Discussions

Interactive comment on "Generation and propagation of stick-slip waves over a fault with rate-independent friction" *by* Iuliia Karachevtseva et al.

Anonymous Referee #1

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The presented work is devoted to the vital problem of active fault dynamics. Discussed are the questions of stick-slip emergence under constant friction factor and relations of propagations of disturbances in the medium. The authors have performed numerical experiments on the basis of 1D spring-block Burridge-Knopoff model and have computed the regularities of propagation of disturbances in an infinitely long elastic rod exposed to shear load with a system of elastic springs. It is shown in the work that sliding at alternating velocity may emerge under constant friction factor. It is also shown, that in the frames of the 1D model of infinitely long elastic rod any disturbance propagates at the velocity of p-waves, and as it propagates its amplitude decreases. The assumption is put forward in the work that this effect can account for the supersonic

propagation of rupture along a fault.

I think that using such simple models has to be accurately grounded, and even more arguments are needed to apply the obtained results to real processes taking place in natural fault zones. The oscillations considered in the first part of the work can't be called "stick-slip", because the latter is characterized by a prolonged stage of rest followed by an abrupt sliding.

I offer several comments that I hope will help improving the paper: General comments: 1. There is no "discussion" in the work, where it would be appropriate to discuss in detail the non-linear effects of disturbance propagation obtained in the work and their links to the processes in nature. 2. In Parts 2 and 3 all the variables and constants used in equations should better be listed once in a single table instead of repeating the terms in different equations with different meanings. 3. In Part 3 the simplest 1D case is considered, so, a disturbance, once emerged, can propagate only along the rod, and the law of its propagation is defined by the parameters E and p which means that the disturbance can only propagate at the velocity of p-wave, because no other motion is possible. 4. The captions should be revised to make them more substantial, clarifying and informative.

I think that the paper needs an essential improvement.

Please also note the supplement to this comment:
http://www.nonlin-processes-geophys-discuss.net/npg-2016-82/npg-2016-82-RC1-supplement.pdf

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