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Interactive comment on "TREMOL: A stochastic rupture earthquake code based on the fiber bundle model. Application to Mexican subduction earthquakes" *by* Marisol Monterrubio-Velasco et al.

Anonymous Referee #2

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The authors introduce a discrete stochastic model of earthquake fault zones based on the so-called time dependent fiber bundle model (FBM). Starting from the classical FBM the authors enhance the model construction by several key elements which are essential to capture the physics of earthquake generation. The main outcome of the work is the simulation code itself which was tested and validated. The role of the most important parameters of the model were tested carefully by computer simulations than the model was applied to study 10 earthquake of Mexican subduction zones. The authors demonstrate that if detailed information is available about a fault system the

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Discussion paper

model can be calibrated to give agreement with field measurements. In such situations the model can also be used for forecasting purpose up to some extent. The manuscript is a valuable contribution to the field. I recommend publication after responding to the following questions and comments:

1. When presenting the background of the model construction, right in the abstract the authors write that FBM is a discrete element model. Discrete element model (DEM) is not a proper wording here. DEM has a well defined meaning in physics and engineering and according to the generally accepted definition of DEM, FBM is not a DEM. FBMs are stochastic discrete models of materials failure.

2. When presenting FBMs the authors write that FBM is a numerical approach ... Actually, FBMs can be solved analytically in the mean field limit so I think "numerical approach" is not a proper wording here.

3. To represent materials' randomness the authors use uniform distributions throughout the work. This is questionable even if relatively good agreement is obtained with field measurements. The authors elaborate on this aspect of the model construction.

4. The authors mention on Page 7 that they are able to simulate "materials weakness or fatigue". I think what they have in the model is "weakening" and not simply weakness.

5. Load transfer is realized through the quantity \pi(x,y). According to the model construction \pi is set such that it generates a localized load sharing in the system, meaning that only nearest and next nearest neigbors share the load of a failed element. However, measurements usually show that long range stress transfer may play a role in earthquake sequences. Do the authors claim that at least in the studied cases short range stress transfer dominated the behaviour of faults?

6. In the validation process the authors only considered subduction earthquakes. Do the authors claim that the model is only applicable to this type of earthquakes? This is an important point which should be clarified in the discussion.

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