Analysis on the role of branching angles in dynamic rupture processes on 3-D branching fault system

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Fault branching is one of the geometrical complexities of fault systems and widely exists in nature. It may heavily influence the patterns of rupture propagation of fault systems. In this study, we investigate the effect of branching angle on rupture inclination and the interaction between branch planes in two-fork branching fault systems by numerical simulation and theoretical analysis based on Mohr’ s circle. A friction law dependent on normal stress is used, and special attention is paid to study how ruptures on the upper branch plane and the lower one affect the stress and rupture on each other separately. The results show that the two branch planes affect each other in different patterns and the intensity of the effect changes with the branching angle. The rupture of the upper branch plane has a negative effect on the rupture of the lower branch plane in case of a small branching angle, but almost no negative effect in case of a large branching angle. The rupture of the lower branch plane, however, suppresses the rupture on the upper branch plane no matter the branching angle is large or small.

