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Dynamic asperity failure triggering during the rupture process?

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Dynamic triggering by the transient deformations associated with seismic waves has been proposed as an alternative mechanism for inducing aftershocks in contrast to the Coulomb stress. This idea is supported by observations of triggered seismicity like for the Mw=7.3 Landers earthquake (1992), the Mw=7.1 Hector Mine (1999), and after the Mw=7.4 Izmit earthquake for which small events began in Greece immediately after the passage of the mainshock surface waves (Brodsky et al, 2000). Gomberg et al (2003) conducted a rigorous analysis of aftershock distribution for 15 mainshocks and showed that most of the triggered events are located in the rupture direction which corresponds to a maximum of the radiated seismic energy. Another argument is the fact that the correctly scaled amplitude of the dynamic deformations are consistent with laboratory observations of failure processes (Gomberg & Johnson, 2005). Finally, work by Felzer and Brodsky (2006) indicates that aftershocks are due to dynamic triggering rather than quasistatic stress changes. Thus instabilities can be triggered as aftershocks as well as at remote distances by seismic waves, suggesting asperities located on the mainshock fault may fail due to transient strains. In this study, we propose to explore that hypothesis.