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Steadiness and stop of brittle fracture driven by the forces in different distances

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Based on the principle of fracture mechanics, the stop criterion of brittle fracture is proposed and the equation of minimal crack stop is given. By using the zero frequency Green function, the steadiness and stop of brittle fracture driven by the concentrated force and simple distributed forces in different locales are analyzed. The critical loading, unsteady boundary line and location of stop points under some typical conditions are calculated. The steady growth caused by the near forces is significant in interpreting the creep and the forming of some tectonics. Whereas the unsteady propagation caused by the forces in different distances from the crack is significant in interpreting the occurring and stop of earthquakes. It is showed the different place of the forces and the force couples can cause single way or double way extending of the fault. It is suggested that the strong earthquakes may be the result of compound of the near-field and far-field forces. The results of this paper are also valuable for investigation of the mechanism of induced earthquake.

Keywords**:** fracture mechanics; physics of earthquake source; dynamics of earthquake rupture; unsteadily propagation; stop of fracture