# EARTHQUAKE MODELING WITH CGFDM: THE RUPTURE DYNAMICS, STRONG GROUND MOTION AND SEISMIC HAZARDS

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The damages caused by earthquakes are becoming more and more serious as the highly developing society. The urgent problems needed to be solved for our country and other earthquake-prone areas are to mitigate the casualties and economic loss. Usually, the large earthquakes which bring intensive damages into the localities occur on faults with complex geometry and other heterogeneous conditions. How to investigate large complex earthquakes by numerical tools is a big challenge task. While keeping the advantages of conventional FDM, e.g. the computational efficiency and the easy implementation, the CG-FDM is also flexible in modeling the complex fault model by using general curvilinear grids, and thus is able to model the rupture dynamics of a fault with complex geometry, such as oblique dipping fault, non-planar fault, fault with step-over, fault branching, even if irregular topography exists. In this work, we use this numerical method to model the dynamic rupture, the strong ground motion and then the seismic hazards distributions of large earthquakes. A typical example is the Tangshan earthquake modeling run on TaihuLight. With support from supercomputers, this physics-based earthquake modeling can help us to investigate large destructive earthquakes and to predict seismic hazards for earthquake scenarios.