Evolutionary model of oblique-rifting basin : Insights from discrete element method

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The geometry of oblique-rifting basin is strongly related with the angle (α) between the trend of rift and that of regional major extensional stress. The main purpose of this study is to investigate characteristics of geometry and kinematics of structure and tectono-stratigraphy during the evolution of oblique-rifting basin. In this study, we simulated the oblique-rifting basin model of various $\alpha$with Particle Flow Code 3-Dimensions- (PFC-3D). The main theory of PFC-3D is based on the Discrete Element Method (DEM), in which parameters are applied to every particle in the models. We applied forces acting on both sides of rift axis, whichα are 45 , 60 , 75 and 90 degrees ,respectively, to simulate basin formation under oblique-rifting process.
The study results of simulation models indicated that:1. the en echelon faults in the rifting basins are sub orthogonal to the trend of major extensional stress; 2. the density of en echelon faults in rift basins decreases gradually when αis close to 45 degrees ; 3. in these models, the α angles, which are 45 , 60 , 75 and 90 degrees, correspond to the angles of 0, 15 -20 , 25 -30 and 50 -60 degrees between the rift trend and en echelon faults trend. According tothe simulation results, the possible dircetions of major extensional stresses during the formation of oblique-rifting basin can be speculated.

Keywords: oblique-rifting basin, discrete element method, PFC-3D

