Geophysical Research Abstracts
Vol. 19, EGU2017-16175-1, 2017
EGU General Assembly 2017

Coupled Hydro-mechanical process of natural fracture network formation in sedimentary basin

zady Ouraga (1,2), Nicolas Guy (1), and amade Pouya (2)

(1) IFP Energies nouvelles, 1 et 4 avenue de Bois-Préau, 92852 Rueil-Malmaison, France, (2) Laboratoire Navier (ENPC-IFSTTAR-CNRS), Université Paris-Est, 77455 Marne la vallée, France

In sedimentary basin numerous phenomenon depending on the geological time span and its history can lead to a decrease in effective stress and therefore result in fracture initiation. Thus, during its formation, under certain conditions, natural fracturing and fracture network formation can occur in various context such as under erosion, tectonic loading and the compaction disequilibrium due to significant sedimentation rate.

In this work, natural fracture network and fracture spacing induced by significant sedimentation rate is studied considering mode I fracture propagation, using a coupled hydro-mechanical numerical methods. Assumption of vertical fracture can be considered as a relevant hypothesis in our case of low ratio of horizontal total stress to vertical stress.

A particular emphasis is put on synthetic geological structure on which a constant sedimentation rate is imposed on its top. This synthetic geological structure contains defects initially closed and homogeneously distributed. The Fractures are modeled with a constitutive model undergoing damage and the flow is described by poiseuille's law. The damage parameter affects both the mechanical and the hydraulic opening of the fracture.

For the numerical simulations, the code Porofis based on finite element modeling is used, fractures are taken into account by cohesive model and the flow is described by Poiseuille's law. The effect of several parameters is also studied and the analysis lead to a fracture network and fracture spacing criterion for basin modeling.