Use of the Finite Element Method on Stress Calculations and Definition of a Unstables Areas in Elastoplastic Media

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The finite element method is a numerical solution technique has been widely used in computational mechanics of solids in the last decades, this solution technique adapts different kinds of multi-physics problems and it's highly accurate when is used appropriately. In this paper, this technique is implemented for stress calculations under the approach of the mechanics of continuous medium and a sequence of methodological steps to generate a computer model of the study area. the research's goal is obtain the stress and strain state of general model to assess quantitatively unstable areas which might have a high impact on migration fluids process. Moreover this goal is supported for rock mechanics, that identifies two theories in the behavior of rock material; fragile behavior and ductile behavior, which are consequences of the dependence of the rate of deformation has suffered material. The elastic-plastic material model describes well the rocks and it's worth and used for fragile behavior, therefore is considered in the stress calculations at hydrocarbon reservoirs scales or moderately large. The estimation of stress fields is of great importance in geomechanical research because supply information of high stress concentration areas and high density fracture areas defined by using failure criteria (In this paper were used Mohr Coulomb, Drucker Prager, and Griffith failure criteria), which is essential for drilling process, wellbore stability and reservoir geomechanical research.