Numerical modelling of hydraulic fracturing in anisotropic cohesive material

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In sedimentary basins the state of stresses induced by regional tectonic is not the only factor to control formation of hydraulic fracturing. Pore water pressure has an important role too. Indeed, fluid overpressure can lead to horizontal fracturing where vertical fracturing should occur, regarding regional state of stresses. So the understanding of pore water pressure effects in hydraulic fracturing has important issues in the study of dyke and sill development, but also in hydrocarbons migration. A numerical model has been developed here to study hydraulic fracturing formation and evolution in sedimentary basins. A biphasic discrete element method has been used to model elastic sedimentary strata. This approach made possible to take sediments pore pressure effects into account. Our models are stratified and each layer is affected by variable low permeability (low permeability enhances effects of pore water pressure). We then address issues in terms of induced vertical anisotropy.