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Mechanical characterization of a CO_2 fractured reservoir by means of microseismicity induced by high pressure injection tests

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Reservoir characterization is an essential issue in geological storage of CO_2 in Technological Development Plant (TDP). In particular, hydromechanical characterization of the caprock-reservoir system is crucial, in order to define the maximum suitable injection pressure and the in-situ mechanical properties. Thus, it is possible to conjecture the hydromechanical behavior of the system during CO_2 injection.

Microseismicity induced by fluid injection may be used as instruments to find out fractured reservoir properties. Indeed, the hydromechanical response is controlled by permeability (k), Young modulus (E) and Poisson ratio (ν). In caprock-reservoir systems, reservoir stiffness controls the stress transfer towards the caprock, where failure may occur. Therefore, the location of the microseismic hypocenters could give information on the reservoir stiffness.

In this work we propose a simulation and calibration method of the microseismicity induced by high pressure fluid injection in a fractured reservoir. Coupled hydromechanical models are peformed. The methology is applied to a particular case study.