

A Fully Coupled Thermo-Hydraulic Mechanical Elastoplastic Damage Constitutive Model for Porous Fractured Medium during CO₂ Injection

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Abstract : A dual-porosity finite element-code will be presented for the stability analysis of the wellbore during CO₂ injection. An elastoplastic damage response will be considered to the model. The Finite Element Method (FEM) will be validated using experimental results from literature or from experiments that are planned to be undertaken at Newcastle University. The main target of the research paper is to present a constitutive model that can help industries to safely store CO₂ in geological rock formations and forecast any changes on the surrounding rock of the wellbore. The fully coupled elastoplastic damage Thermo-Hydraulic-Mechanical (THM) model will determine the pressure and temperature of the injected CO₂ as well as the size of the radius of the wellbore that can make the Carbon Capture and Storage (CCS) procedure more efficient.

Keywords : carbon capture and storage, Wellbore stability, elastoplastic damage response for rock, constitutive THM model, fully coupled thermo-hydraulic-mechanical model

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