CIVIL AND ENVIRONMENTAL ENGINEERING

ENI CORPORATE UNIVERSITY - Fluid production and Underground storage: Reservoir Dynamic Modelling

Funded By	ENI CORPORATE UNIVERSITY S.P.A. [P.iva/CF:12561370151]
Supervisor	VIBERTI DARIO - dario.viberti@polito.it
Contact	VIBERTI DARIO - dario.viberti@polito.it
Context of the research activity	The definition of a reliable and representative Reservoir Dynamic Model (RDM) requires: selection of the appropriate modelling approaches; characterization of model parameters; proper calibration based on available historical data. IN case of Underground Storage of Natural Gas (UGS), Hydrogen (UHS) or CO2, compositional RDM based on Equation Of State (EoS) has to be adopted. PVT studies on fluid mixtures of interest and EoS selection and calibration are fundamental steps that need investigation. Position reserved to candidates selected by the Iraqi Ministry of Oil.
Objectives	This PhD activity will be divided into both laboratory tests and modelling activities. Laboratory tests will be dedicated mainly to characterizing the thermodynamic and phase behavior of several mixtures of species of interest, such as Hydrogen, Methane, and Carbon Dioxide, under significant ranges of pressure and temperature conditions. Experiments will be conducted using a laboratory setup featuring a full-visual PVT cell, a cooling system for vapor separation, and a gas meter. The modelling activity will consist of several steps: comparison between by different EoS and the results of experimental activity; calibration, if necessary, of the EoS, investigating and adopting proper optimization algorithms; definition of RDM according to the considered and calibrated EoSs in both simplified but realistic models and full field models. Part of the EoS calibration will be carried out using in-house dedicated algorithms, whereas the RDM will be defined using commercial and/or open-source software.
Skills and competencies for the development of the activity	A knowledge of petrophysical properties, rock-fluid interaction properties, multiphase flow phenomena, and the main methodologies adopted in reservoir engineering for the study of underground saturated geological formation from both static and dynamic points of view.