# Development of a System Model for Performance Assessment of Geologic CO2 Sequestration Sites

Rajesh Pawar

United States (rajesh@lanl.gov)

Carbon dioxide (CO2) capture and storage (CCS) in geologic formations is one of the technologies currently being pursued to mitigate the increasing concentrations of CO2 in the atmosphere. If this technology is to be widely deployed, its overall safety and effectiveness needs to be understood. This will require developing effective approaches to predict long-term risks of geologic CO2 storage including computational models for long-term performance assessment. Deep saline aquifers are some of the major targets for large-scale CO2 storage. One of the main challenges with these formations is lack of adequate and appropriate characterization data. In order to predict overall behavior of such formations uncertainties and their impact on predictions must be taken into account.

At Los Alamos National Laboratory we are developing the CO2-PENS (Predicting Engineered Natural Systems for CO2 Storage) system level model for use in performance and quantitative risk assessment of geologic sequestration of CO2. CO2-PENS is designed to link together many different processes (e.g., subsurface injection of CO2, CO2 migration, leakage, and atmospheric mixing) required in analysis of long-term storage of CO2 in geologic media. Each underlying process in the system model is built as a module that can be modified as the simulation tool evolves toward more complex problems. The model is designed such that it can be used to perform probabilistic simulations of the feasibility of potential sequestration sites in terms of capacity and injectivity as well as the long-term fate of a CO2 sequestration operation. This talk will provide an overview of the approach taken to develop the model and example applications.