

Numerical analysis on CO₂ storage capacity

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CO₂ geological storage is expected as a mitigation measure for climate change. The main subject of the storage evaluation on the underground reservoir are (1) evaluation of CO₂ storage capacity, and (2) evaluation of injectivity. In this research, we reported a methodology for the evaluation of storage capacity via numerical analysis geological information is generally limited, the approximate CO₂ storage capacity at the site selection stage has been evaluated by "Volumetric Method". If detailed geological information such as inclination of reservoir layer, inhomogeneity of physical properties, geomechanical strength of cap rock etc. were obtained at a CO₂ storage site, more accurate storage capacity can be evaluated by numerical analyses.

In this research, we adopted a numerical analysis method to evaluate CO₂ storage capacity. After a geological model was built, we carried out simulations of CO₂ injection. For the simulation for multicomponent / multiphase fluid, TOUGH2-ECO2N code used. Comparing the "Volumetric Method" with the result of the numerical analysis, the latter was estimated to be about 65% of the former.

From the analogy of oil/gas field, the CO₂ storage capacity evaluated by the "Volumetric Method" corresponds to "Resources amount" and that evaluated by numerical analysis would be "Reserves". As a result, the difference between the "Volumetric Method" and the result of numerical analysis seems to be generally reasonable.

In addition to the storage capacity evaluation, numerical analysis can give estimation on the pressure build-up in the reservoir and the distribution of the CO₂ plume. Hence, it is expected that the design of the location and number of injection wells, injection rate, injection period installation of pressure mitigation wells etc. could be evaluated from the analysis results.

Keywords: Carbon dioxide capture and storage, TOUGH2, Reservoir Simulation