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DECOVALEX – an International Project on Coupled Thermo-Hydro-Mechanical Processes in Fractured Rocks

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The international cooperative project DECOVALEX (acronym for DEvelopment of COupled THM models and their VALidation against EXperiments) was established in 1992 by national agencies involved in nuclear waste disposal. The aim of this project is to develop and test models capable of simulating coupled thermo-hydro-mechanical (THM) processes that would impact the performance of a waste repository located in geological media. Over the last ten years, about 16 research teams from 10 countries have participated in this joint effort. The project objectives include: a. support development of computer simulators for THM modeling; b. investigate and implement suitable algorithms for THM modeling; c. compare model calculations with results from field and laboratory experiments; d. design new experiments to support code development, and e. study the application of THM modeling to performance and safety assessment.

A large number of benchmark tests (BMT) and test cases (TC) have been studied within the project. BMTs are hypothetical problems used for investigating the behavior of individual coupled THM processes, using alternative conceptual and numerical models by different teams. TCs are laboratory and field experiments that were analyzed to advance our understanding of THM processes and whose data were used to test computer models. A number of large-scale, multiyear experiments have been studied within the project, including: a. multiple borehole tests for shaft excavation design at Sellafield, UK; b. THM experiment on the bentonite-rock system at Kamaishi Mine, Japan; c. full scale bentonite-rock test (FEBEX) at Grimsel Underground Research Laboratory, Switzerland; d. Drift Scale Heater Test (DST) in the Exploratory Studies Facility at Yucca Mountain, USA. The talk will present an overview of the twelve-year project by highlighting a few of the main results and lessons learned.

Reviewed by H. H. Liu, September 2, 2003.