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An efficient numerical simulation of coupled thermo-hydro-mechanical processes in deep tight gas reservoirs

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Deep tight gas is an important unconventional natural gas resource, and it is an important target of exploration and development in recent years. Deep tight gas reservoirs are high-temperature, high-pressure, and high-stress with complex gas–water relationships, and its occurrence and flow mechanisms are still unclear, making the simulation of deep tight gas reservoirs still a challenging problem. Aiming at the key problems faced in the development of deep tight gas reservoirs, this paper establishes a flow-stress-temperature field coupled mathematical model and numerical model, studies the thermo-hydro-mechanical sequential decoupling method to solve the coupled mathematical model, and forms a multi-field coupled simulation technology which provides theoretical support for the development of deep tight gas. Based on the thermo-hydro-mechanical coupling calculation module, this paper conducts research on the influence of thermo-hydro-mechanical multi-field coupling parameters on the production and development performance, and it further verifies the practicability of our proposed model in real
reservoirs.

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