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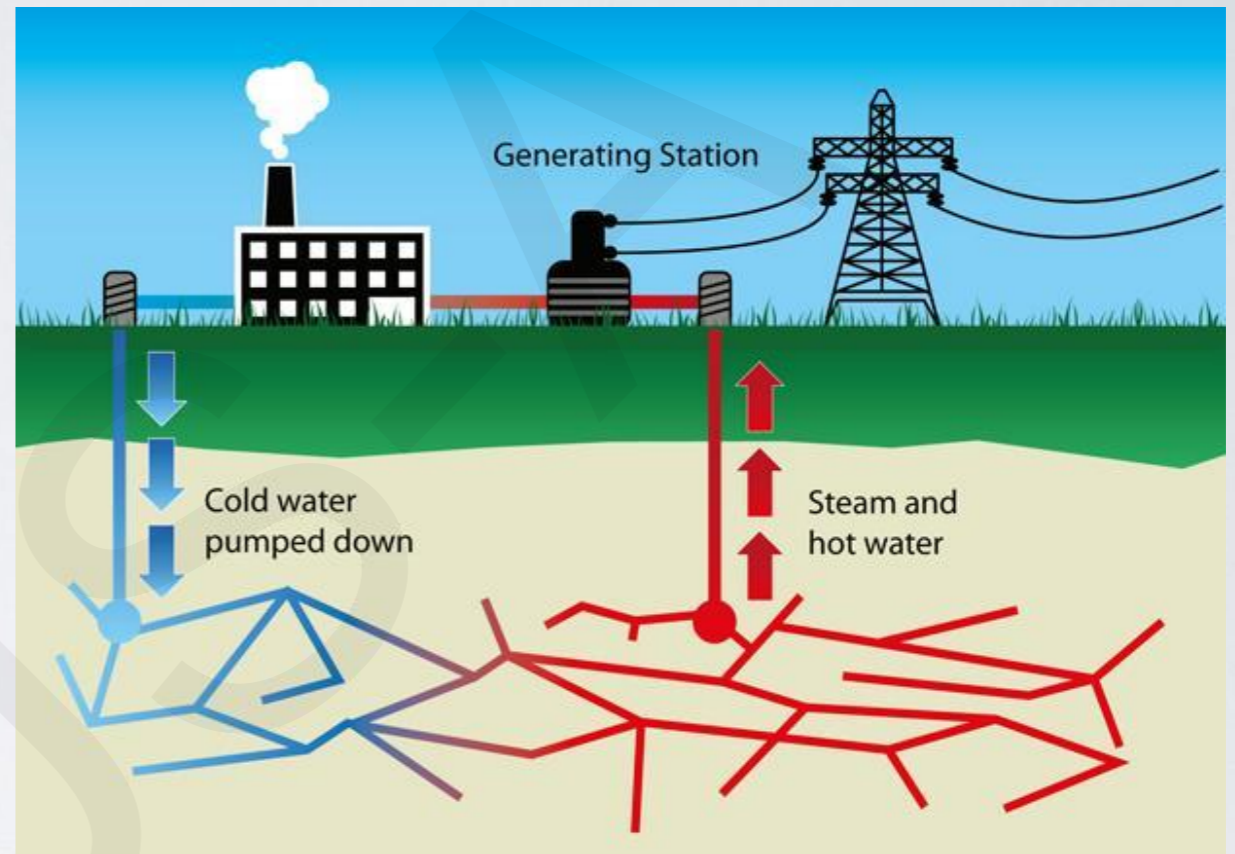
Dynamic response of bilayered saturated porous media based on fractional thermoelastic theory

Key words:

bilayered saturated porous media; thermo-hydro-mechanical coupling dynamic response; fractional thermoelastic theory; thermal contact resistance; elastic wave impedance

Application of THM coupling theory

Extraction of geothermal energy



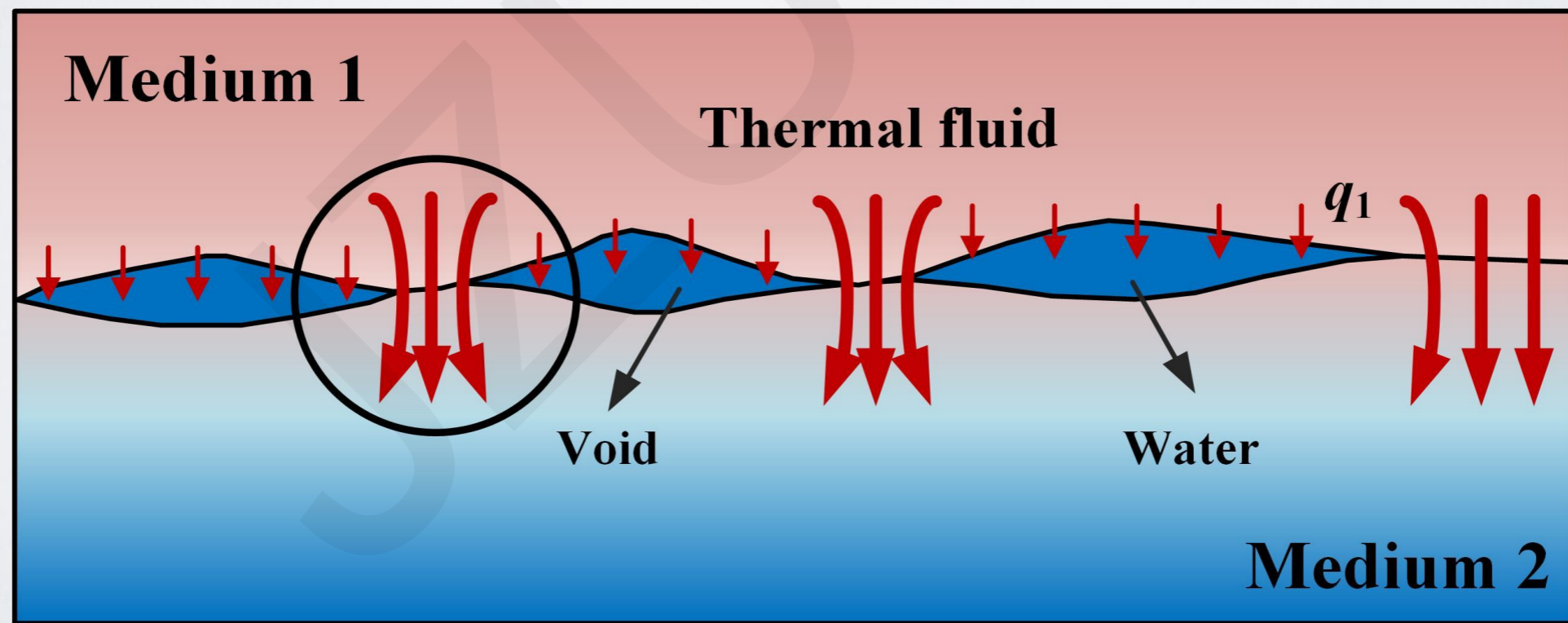
Deep geological disposal of radioactive waste



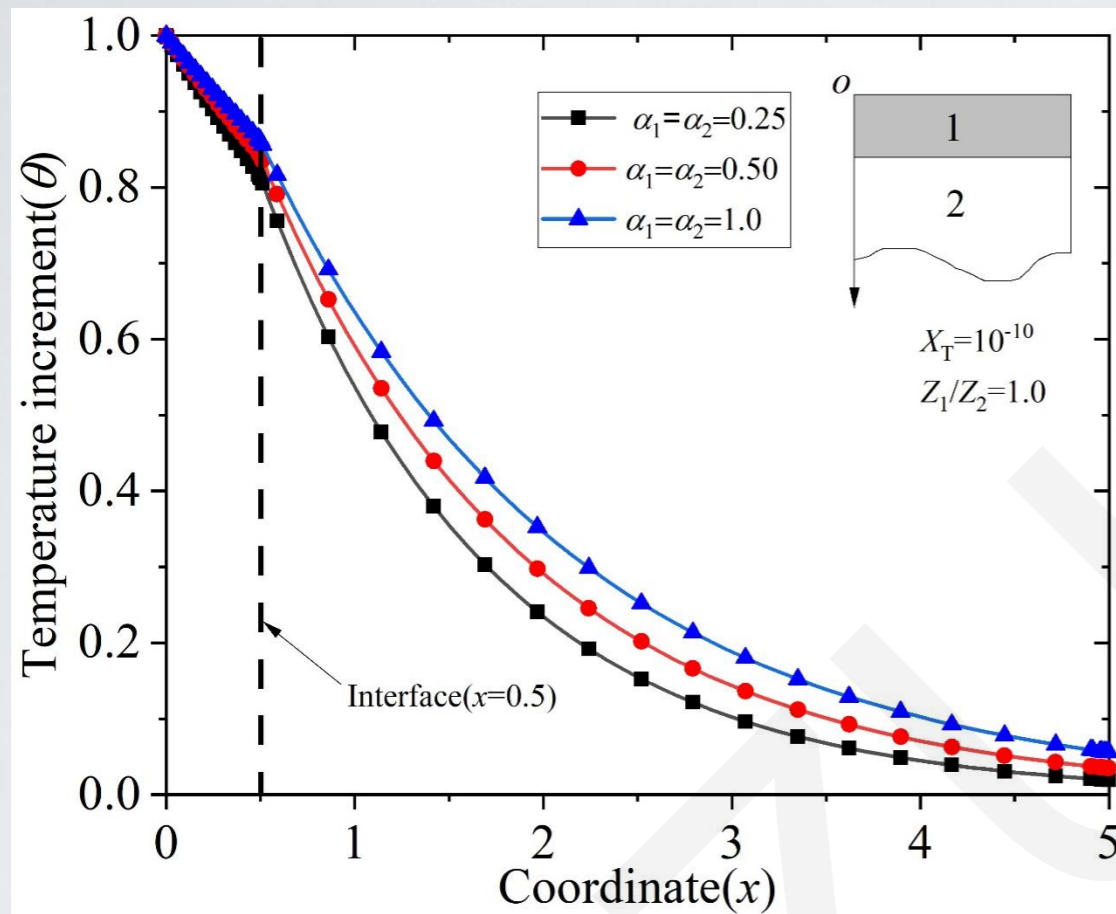
Thermal contact resistance model

Thermal contact resistance is generated by the coupling effect of three factors, i.e., heat, force, and material, and is also affected by the following two factors:

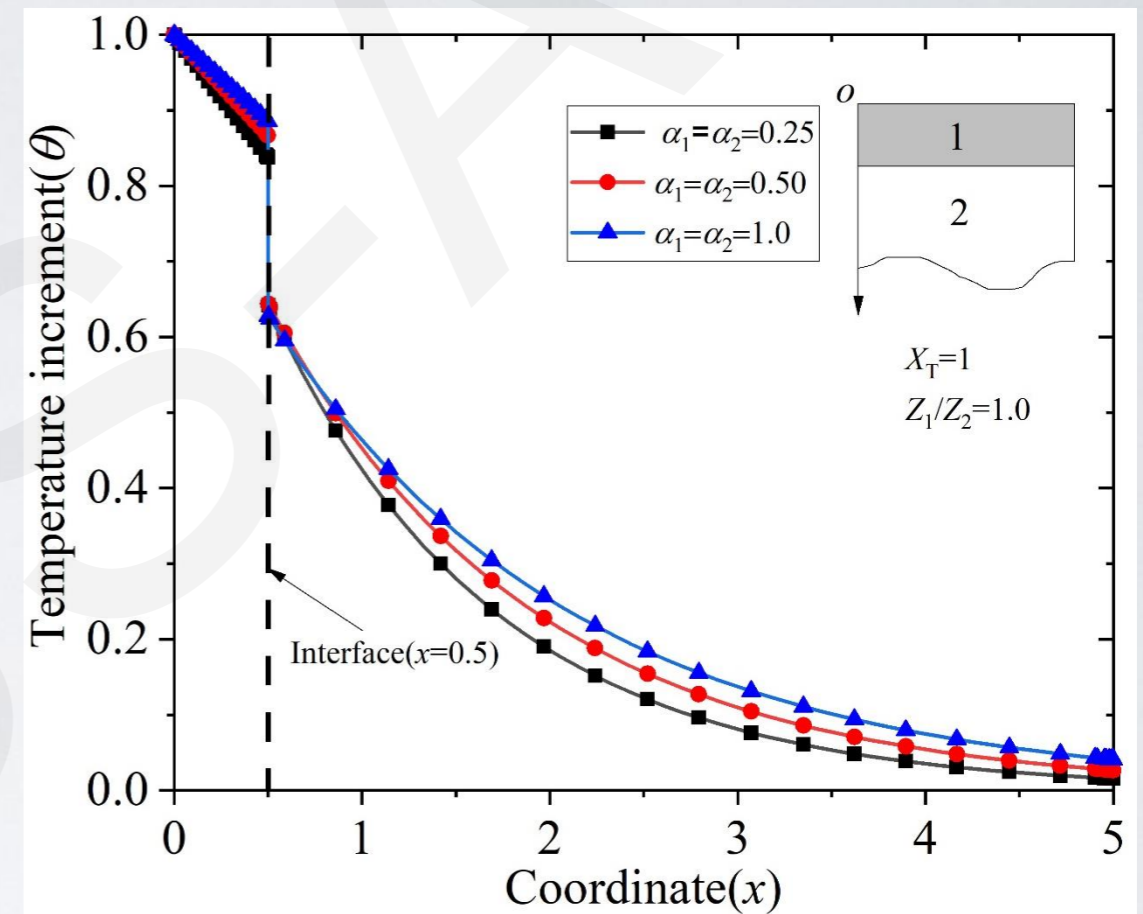
- surface roughness
- material properties of the contact media



Effects of fractional derivative parameters

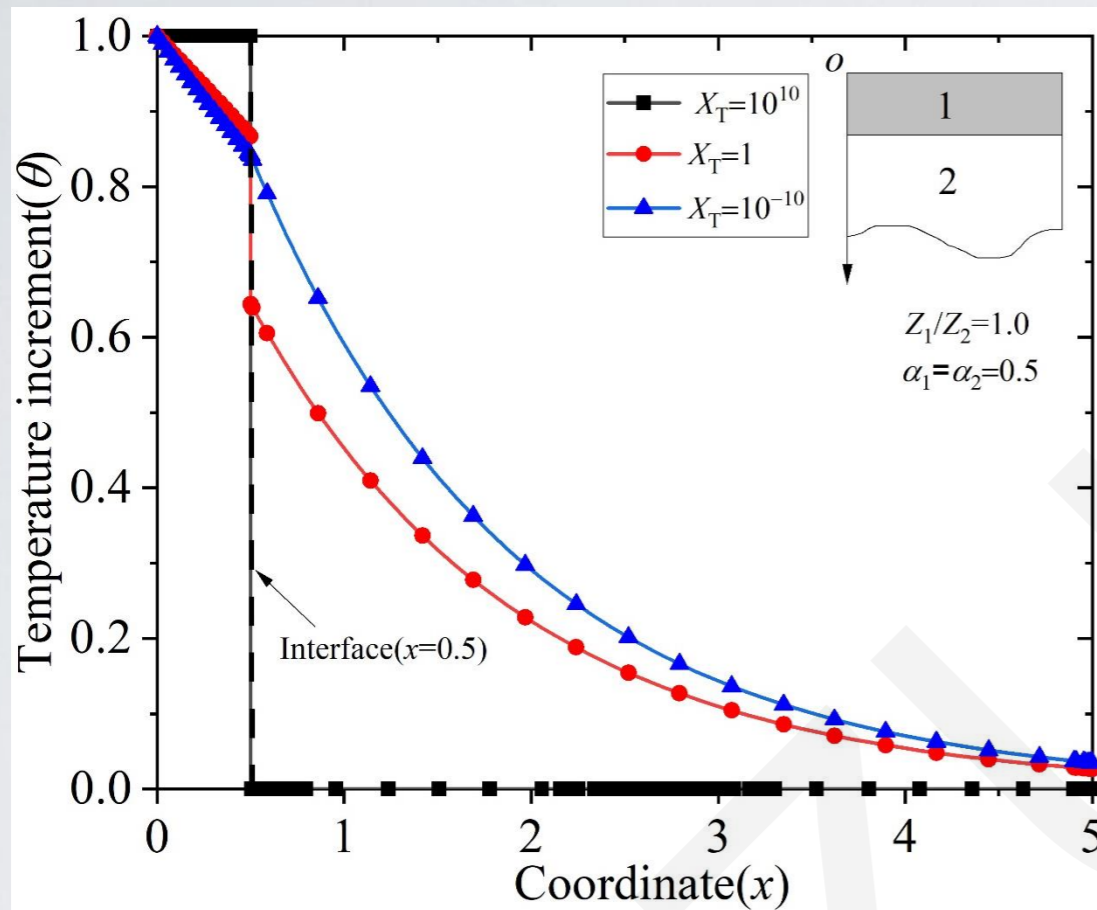


$X_T = 10^{-10}$ and $Z_1/Z_2 = 1$

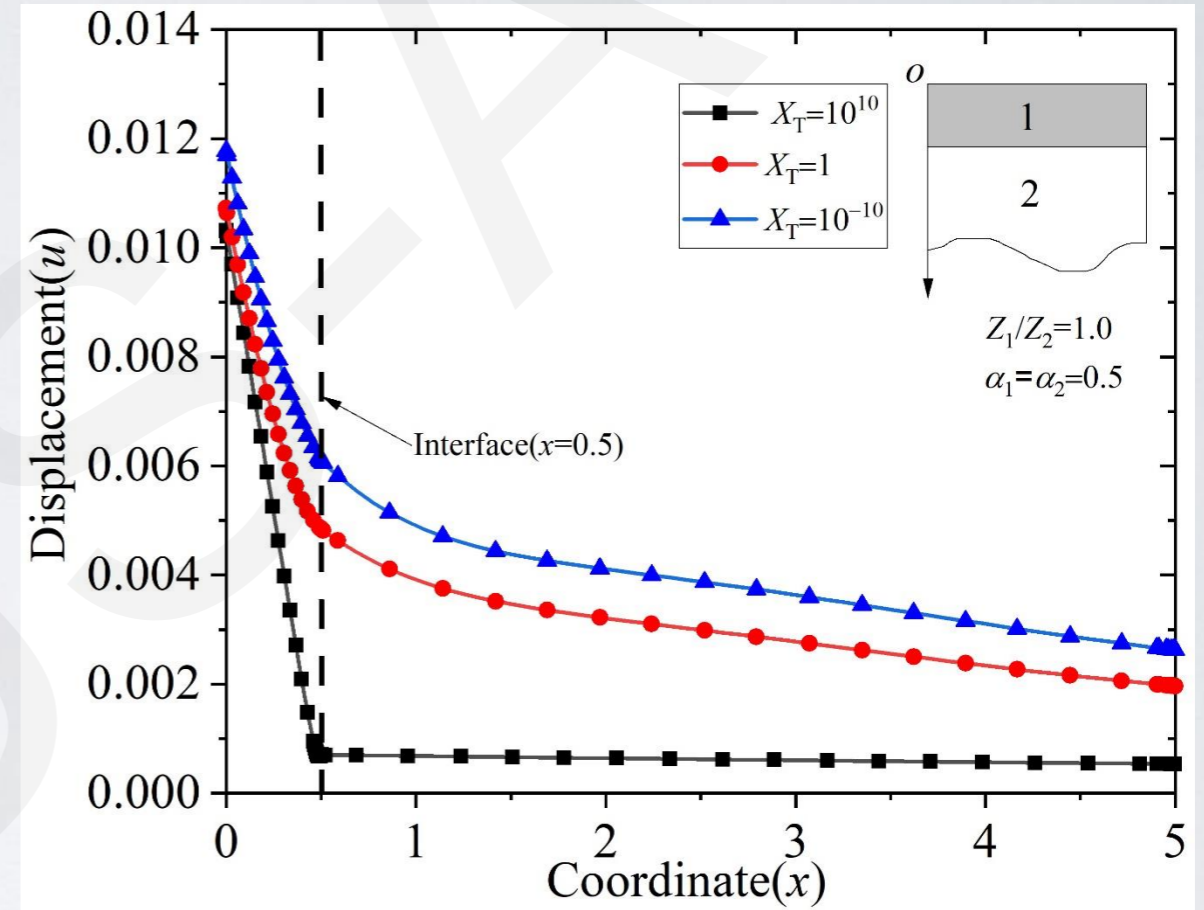


$X_T = 1$ and $Z_1/Z_2 = 1$

Effects of thermal contact resistance



Temperature increment



Displacement

Perspectives and Research Priorities

- The effect of fractional derivative parameters on the THM coupling response is related to the thermal contact resistance at the interface. If there is thermal contact resistance at the interface, the effect of the fractional derivative parameters on the system re-sponse is weakened. The fractional derivative parameters can reveal the heat conduction intensity and thermodynamic behavior of the THM coupling re-sponse of a bilayered saturated porous media.
- Because of thermal contact resistance at the interface, the temperature increment at the interface exhibits a jumping phenomenon, which becomes more obvious as the thermal contact resistance increases. With the increase of thermal contact resistance, the displacement, pore water pressure and stress at the interface decrease gradually.