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Experimental investigation of heat transport through single synthetic fractures

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In fractured geothermal reservoirs, heat transport is highly influenced by the presence of the fractures, so appropriate knowledge of heat behaviour in fractured porous media is essential for accurate prediction of the energy extraction in geothermal reservoirs.
The present study focuses on the study of heat transport within single synthetic fractures. In particular manner several tests have been carried out in order to explore the role of fracture roughness, aperture variability and the fracture-matrix ratio on the heat transport dynamics.
The Synfrac program together with a 3d printer have been used to build several fracture planes having different geometrical characteristics that have been moulded to generate concrete porous fractured blocks. The tests regard the observation of the thermal breakthrough curves obtained through a continuous flow injection in correspondence of eight thermocouples located uniformly on the fractured blocks.
The physical model developed permits to reproduce and understand adequately some features of heat transport dynamics in fractured media. The results give emphasis on the errors of the assumptions commonly used in heat transport modelling.