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Atmospheric and Subsurface Radionuclide Background and Dispersion

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A general code has been developed to describe two phase flow, tracer transport and thermal effects through a fractured porous medium on the Darcy scale under the action of constant or time dependent pressure fluctuations. The fractures are modeled as surfaces with specific properties. The fluid properties can depend on pressure and temperature.
The equations for flow, tracer concentration and temperature are discretized by the finite volume method on triangular and tetrahedral meshes.
The three modules which compose the code, namely flow/energy/tracer transport are parallelized by the OpenMP technique and shown to function satisfactorily separately and in interaction.
Applications of this code are made to a typical situation of interest with an underground cavity and a potential chimney. The dimensions of the geological medium above are 100x100x400m; it contains 147 fractures of radius 20 m and of equivalent aperture 1 mm. The fracture network is percolating from the cavity up to the surface. The initial pressure is 200 bars and the temperature 1000 K. All these characteristics can be modified at will.
Pressure, temperature, and concentration evolutions as well as surface fluxes will be presented and discussed.

Promotional text

A code is developed for two phase flow, tracer transport and thermal effects through a fractured porous medium under the action of pressure fluctuations. The fractures are modeled as surfaces with specific properties.The fluid properties can depend on pressure and temperature.

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