BASIMO - Borehole Heat Exchanger Array Simulation and Optimization Tool

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Borehole heat exchangers represent a well-established technology, which pushes for new fields of applications and novel modifications. Current simulation tools cannot – or only to some extent – describe features like inclined or partly insulated boreholes unless they run fully discretized models of the borehole heat exchangers. However, fully discretized models often come at a high computational cost, especially for large arrays of borehole heat exchangers. We present a tool, which uses one dimensional thermal resistance and capacity models for the borehole heat exchangers coupled with a numerical finite element model for the subsurface heat transport. An unstructured tetrahedral mesh bypasses the limitations of structured grids for borehole path geometries, while the thermal resistance and capacity model is improved to account for borehole heat exchanger properties changing with depth. The presented tool benefits from the fast analytical solution of the thermal interactions within the boreholes while still allowing for a detailed consideration of the borehole heat exchanger properties.