TYPE 556: DETAILED BURIED PIPE

General Description

Type556 models a horizontal ground coupled heat exchanger or, more simply, a horizontal pipe buried in the earth. The model is based on work done in a Master of Science Thesis by John Giardina at the Solar Energy Lab at the University of Wisconsin. Giardina's work is based in turn on an earlier work by V.C. Mei of Oak Ridge National Laboratory.

Mathematical Description

This model accounts for ground seasonal temperature variations and backfilling of the trench containing the pipe. The fluid convection, the pipe wall, and the backfilled material are all represented as a net resistance. The inner soil nodes, those in contact with the backfill are also modeled without capacitance. The rest of the nodes within the soil are modeled as capacitors connected by resistors in both the radial and circumferential directions.

Rather than summarizing Giardina's work, a copy of his Master's Thesis is included. The pdf file is entitled "Type556-GiardinaThesis.pdf"