COMPUTATIONAL ANALYSIS OF THERMOPHYSICAL AND FLOW CHARACTERISTICS IN GAS CAVERNS

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ABSTRACT
Turbulent buoyancy flows in underground storage of natural gas at high pressures provide convection of heat at the interface of the cavern wall. Further, these flows are responsible for advection and redistribution of heat and water in the cavern. These intrinsic properties are addressed in this study. Two-dimensional transient computations for an idealized cylindrical cavern have been performed to predict the buoyant characteristics. Next, these characteristics have been prepared for implementation in a simpler one-dimensional transient computer model. This simpler model features the overall inherent properties of gas storage operations. In addition, the model is very robust with a relatively high simulation speed, both features that are highly appreciated in an operational environment. A comparison between recorded and simulated pressure and temperature trends at the wellhead during *seven days* of gas withdrawal yields a good agreement.