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Modelling of Cavity Growth in Underground Coal Gasification

Authors : Preeti Aghalayam, Jay Shah

Abstract : Underground coal gasification (UCG) is the in-situ gasification of unmineable coals to produce syngas. In UCG, gasifying agents are injected into the coal seam, and a reactive cavity is formed due to coal consumption. The cavity formed is typically hemispherical, and this report consists of the MATLAB model of the UCG cavity to predict the composition of the output gases. There are seven radial and two time-variant ODEs. A MATLAB solver (ode15s) is used to solve the radial ODEs from the above equations. Two for-loops are implemented in the model, i.e., one for time variations and another for radial variation. In the time loop, the radial odes are solved using the MATLAB solver. The radial loop is nested inside the time loop, and the density odes are numerically solved using the Euler method. The model is validated by comparing it with the literature results of laboratory-scale experiments. The model predicts the radial and time variation of the product gases inside the cavity.

Keywords : gasification agent, MATLAB model, syngas, underground coal gasification (UCG)
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