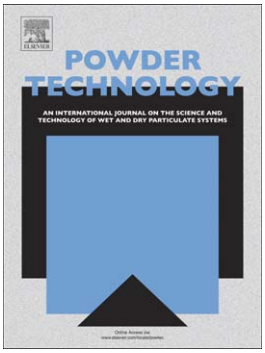

Calibration of discrete element properties and the modelling of packed rock beds

C.J. Coetzee, R.G. Nel

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CALIBRATION OF DISCRETE ELEMENT PROPERTIES AND THE MODELLING OF PACKED ROCK BEDS

C.J. Coetzee[1] and R.G. Nel[1]

The increased necessity to obtain energy from other sources than conventional fossil fuels has led to the growing interest in solar energy. The problem with the proposed technology is that it can only provide power during the day and therefore requires some sort of storage system, if power is to be supplied throughout the day and night. A number of storage systems exist, but the one of particular interest is packed rock beds. Discrete Element Models (DEM) of rock beds were developed through both experimental and numerical procedures, by conducting a series of sensitivity and calibration studies. Through these procedures, a set of micro properties could be determined to accurately model the rock particles. The properties were verified by modelling the discharge from a hopper with three different opening widths. Further, the research focused on the potential of constructing self-supporting tunnels within the rock beds in order to improve the air flow through the bed by minimizing the pressure drop. Horizontal and vertical tunnels were investigated, each with different diameters. It was observed that if the appropriate steps were followed, stable self-supporting tunnels could be formed using particles of different scale.

Discrete Element Modelling (DEM), property calibration, hopper discharge, packed rock beds, self-sustaining tunnels

[1] Department of Mechanical and Mechatronic Engineering, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa. Tel: +27 (21) 808 4239, Fax: +27 (21) 808 4958, E-mail: ccoetzee@sun.ac.za