

25 March 2018

## Postdoctoral Research Fellowship

*Granular Flow Modelling in Comminution Devices and Process Flow Modelling of Diamond Extraction*  
Centre for Minerals Research (CMR), Department of Chemical Engineering, University of Cape Town

The CMR invites suitably qualified candidates to apply for a Postdoctoral Research Fellowship within the Comminution group. The project involves two concurrent research areas. The first part is developing granular flow models to quantify granular flow in various mills used in comminution. The model to be developed will be a rheological description that captures all the features of granular flow inside the different geometries of various mills and scrubbers. Existing empirical models of such comminution devices tend to be extremely dependent on boundary conditions and do not allow for confident extrapolation beyond their window of design. To go beyond the current state-of-the-art in modelling, the CMR applied physics group is developing a fundamentals based model that can model the mechanisms of operations and mill itself. The main role of the Postdoctoral Research Fellow in this area will be to develop a mesoscale continuum granular model for granular flow in various geometries, with a focus on horizontally stirred mills and scrubbers. The models will be tested computationally using Discrete Element Method simulations.

The model developed will be used to determine the greatest region of breakage occurring in the process of extracting diamonds from their surrounding minerals, specifically focusing on scrubbers. This work requires the tracking of simulants placed within the process flow, along with computational modelling of the identified high breakage regions, using the granular flow model and DEM Simulations as a starting point.

## Responsibilities

1. Extend the continuum-level modelling of granular flow to granular flow in scrubbers used in diamond processing.
2. Extract the kinematic data of the continuum model from DEM simulations. This will highlight if the scrubber is one of the processes contributing to diamond breakage.
3. Complete site surveys of the diamond extraction processes and model the breakage of material within those processes, to identify areas where breakage may be excessive.

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4. Assist with the supervision of graduate students in both DEM simulations of horizontally stirred mills and process flow of diamond extraction.

**Value of the Fellowship:** R 240000 per annum. The duration of the fellowship is 12 months, renewable subject to availability of funds and satisfactory academic progress. No benefits or allowances are included in the value of the fellowship. The fellowship is compliant with the SARS policies/rules and is therefore exempt from taxation.

**Conditions of Award:**

1. Candidate should have a PhD obtained within the last five years
2. Applicants may not previously have held full-time permanent professional or academic posts.

**Academic Criteria:**

1. A PhD degree in the field of mineral processing, physics or chemical engineering within the last five years.
3. A strong programming skill is required – preferably in MATLAB.
4. Candidates must be actively involved in granular flow modelling and have experience in DEM simulations.

The candidate should be available to commence with the Fellowship in April 2018. The successful incumbent will be required to comply with the University of Cape Town's approved policies, procedures and practises for the postdoctoral sector. Interested candidates should send a letter of application stating their area of expertise and research interests, their curriculum vitae, copies of all academic transcripts, and contacts of two referees to Prof. Aubrey Mainza [aubrey.mainza@uct.ac.za](mailto:aubrey.mainza@uct.ac.za) Eligible and complete applications will be considered by the Director of the unit. The deadline for applications is 31 March 2018.

The University of Cape Town reserves the right to:

1. Disqualify ineligible, incomplete and/or inappropriate applications
2. Change the conditions of the award or to make no awards at all.

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