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Bulk flow properties of pulverised coal systems and the relationship between
inter-particle forces and particle contacts

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Abstract

Two groups of lignite powders characterized by different particle size distributions were prepared herein to investigate the effect of particle size distribution (PSD) on the flow properties of fine powders. The first group was composed of samples with a narrow PSD and prepared using an air classifier. The second group was made of two different samples of the same lignite material characterized by industrial-grade particle size distributions, which were much wider in range than the samples of the first group. The experimentally determined flow properties were used to understand the effect of the PSD. The packing properties and the flow behaviour of all the coal powder samples were characterized in terms of compressibility and flow properties using an FT4 powder flow rheometer. Furthermore, the Brunauer, Emmett and Teller surface areas and the dispersive surface energies were determined using a surface energy analyzer. The samples with similar mean particle sizes, but different particle size distributions, provided significantly different results. Accordingly, a micro-scale approach inspired by the Rumpf and Molerus

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