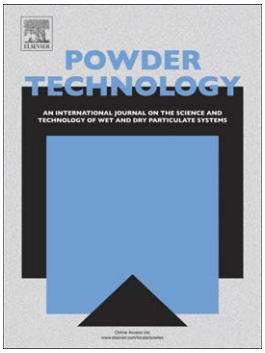

Three dimensional shape analysis of concrete aggregate fines produced by VSI crushing

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Three dimensional shape analysis of concrete aggregate fines produced by VSI crushing

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Abstract: We studied the 3-D shape of concrete aggregate fines with particle sizes between 3 µm and 250 µm produced by high-speed vertical shaft impact (VSI) crushing of rock types from 10 different quarries representing a wide range of local Norwegian geology with respect to mineralogy and mechanical properties. This included igneous (intrusive and extrusive), metamorphic, and sedimentary rocks that were both mono- and multi-mineralic. VSI crushing seems to be able to generate concrete aggregate fines of very similar equidimensional mean shape characteristics for the whole analysed size range, independent of the mineralogical composition of the rocks included in the study. The effect on normalising the average particle shape was somewhat lower for the particle size range smaller than about 15 µm, where there seems to be a greater influence of the crystallographic structure of the individual minerals. Particles of the rock type containing the highest mica content (5.5 %, by mass) had the least equidimensional shape. The most equidimensional shape in a given particle size range was found for both limestone rock types that were analysed. A new shape parameter, the micro-Flakiness Index (µFI), has been proposed to characterize the shape of the fine crushed concrete aggregate particles to enable practical use of shape parameters.