Modeling of elutriation phenomenon in fluidized beds NAN XIE,
FRANCINE BATTAGLIA, KEVIN TIMMER, ROBERT BROWN, Iowa State University — Elutriation occurs extensively in fluidized processes due to input of a wide
range of particles or formation of fines by way of attrition. The entrained solids must
be recovered or removed from the gas because of economic or environmental reasons.
Thus the total quantities entrained and the concentration of solids in the gas stream
must be known in order to design the solids removal systems. In the current research,
the elutriation phenomenon is simulated using a multi-fluid finite-volume code. Numerical simulations are used to predict elutriation behavior for two types of solid
particles with different diameters and densities fluidized by air in a laboratory-scale
bed. The superficial gas velocity is chosen between the terminal velocities of the two
solids. The total solids entrained for varying initial mass fractions of fines in the
bed are computed and compared with experiments. The elutriation rate constants
obtained from simulations are compared with the empirical formulations available
in the literature. The concentration of solids distribution in the freeboard along the
bed height is also presented.

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