(also quoted by Gidaspow et al.) and Martin and Padmanabhan,[3] are described by Eq. (2) with $C_0 = 1.2$.

Beattie's analysis indicates that the distribution parameter also influences choked flow velocities. It is recommended that two-phase propagation analyses, such as that of Gidaspow et al.,[1] incorporate phase and velocity distribution effects in the treatment of slip between the phases.

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[1]D. R. H. BEATTIE, *Nucl. Sci. Eng.*, **86**, 241 (1984).

Reply to "Effects of Phase and Velocity Distribution on Two-Phase Pressure Pulse Propagation"

It is very nice that Beattie[1] was able to fit the pressure pulse propagation data with just one fitted parameter. His simple expression for critical flow is useful. However, in the age of supercomputers, the empirical distribution or the drift flux theory as ably presented by Nicoll et al.[2] has been to some extent superceded by the two-fluid theories, such as the one we had presented for one-dimensional flow. For two dimensions, we[3-6] recently used a two-fluid theory to predict time-averaged void fractions, bubble sizes and shapes, and velocity profiles for fluidization of solid particles without the use of any fitted parameters. A stress term was used to keep the particles from collapsing to a volume fraction of one. Beattie's remarks and his use of fitted parameters show that more work is needed to fully understand unequal velocity, critical two-phase flow.

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[2]G. INAYATULLAH and W. B. NICOLL, "Application of the Drift-Flux Formulation to the Prediction of Steady, Periodic and Transient Two-Phase Flows," *Proc. NATO Advanced Study Institute, Two Phase Flows and Heat Transfer*, Vol. 1, p. 209, S. KAKAC and F. MAYINGER, Eds., Hemisphere Publishing Corp., Washington, D.C. (1977).

[3]D. GIDASPOW, C. LIN, and Y. C. SEO, *I&EC Fundamentals*, **22**, 187 (1983).

[4]D. GIDASPOW and B. ETTEHADIEH, *I&EC Fundamentals*, **22**, 193 (1983).

[5]D. GIDASPOW, Y. C. SEO, and B. ETTEHADIEH, *Chem. Eng. Communications*, **22**, 253 (1983).

[6]B. ETTEHADIEH, D. GIDASPOW, and R. W. LYCZKOWSKI, "Hydrodynamics of Fluidization in a Semi-Circular Bed with a Jet," accepted for publication in *AIChE J.* (1983).