To the Editor:

Defluidization is a complex phenomenon without any current adequate quantitative definition. To define defluidization, it is necessary to decide first what is fluidization. Conventionally, this has been defined in terms of a minimum fluidization velocity, where the bed is accepted as being "fluidized" once the pressure drop vs. superficial gas velocity curve levels off (see, for example, Kunii and Levenspiel, 1991). It is generally accepted that this ought to occur at the point where the drag forces induced by the upwardly flowing gas support the buoyant weight of the particle (+moisture/other binding agents) bed. However, it has been demonstrated that values ranging at least from 45% to 180% of the support of the particles' buoyant weight are possible, while the bed is "fluidized" according to the commonly accepted criterion (Jolly and Doig, 1973; Wright, 1997).

In a recent article by Schouten and van den Bleek (1998), *fluidization quality* is defined as "the state of the fluidized bed that leads to an optimal mixing of the gas and the solids throughout the bed, with easy handling of bed material, a steady in-bed temperature distribution, and a stable average bed-pressure drop." While this is, of course, what is desired, that is, high-quality fluidization, it highlights a problem, the inability to actually quantify the *fluidization quality*, other than saying that the bed apparently is behaving correctly.

The assertion of Schouten and van den Bleek (1998) is true that bed pressure drop alone is likely to be insufficient as a tool for measuring *fluidization quality*. This can be confirmed by observing the aforementioned comments on the range of acceptable pressure drop (and, by implication, particle support); however, in addition, it has been shown for fluidized beds subject to increased levels of cohesion that it is possible for the bed pressure drop to remain stable, or even increase (Wright and Raper, 1998). Therefore, it is important to note that defluidization may not always be characterized by a decrease in bed pressure drop, as initially suggested by Schouten and van den Bleek (1998).

The work by Schouten and van den Bleek (1998) represents an important step in attempting to quantify *fluidization quality* by providing a tripartite approach to possible assessment. This is particularly important as other common tools for identifying changes in behavior, average absolute deviations or standard deviations of pressure fluctuations, have been shown to be often insensitive to cases of severe "defluidization," or, in fact, in some circumstances show a reverse trend (Wright, 1997). In these instances the magnitude of pressure fluctuations can increase as a result of the vastly altered hydrodynamics resulting from the "fluidization" of agglomerates rather than single particles, or, indeed, the vigorous bubble rupture resulting from the breakage of cohesion-stabilized bubble caps or ceilings.

The major importance, therefore, in the work of Schouten and van den Bleek (1998) lies in the ability to detect changes in "fluidization" behavior. It is likely to be difficult, at this stage, for their method to detect an absolute change in *fluidization quality*, as this has no absolute quantitative measure. Further work is required to quantitatively define *fluidization quality* in terms of particle-particle interactions and particle-fluid interactions before major improvements in efficiency and controllability can be realized.

Literature cited

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Phillip C. Wright
Dept. of Mechanical and Chemical Engineering
Heriot Watt University
Edinburgh EH14 4AS, Scotland, U.K.