Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

The singularity in particle-laden boundary layers M.R. FOSTER, Ohio State U., P.W. DUCK, U. Manchester, R.E. HEWITT, U. Manchester — The classical "dusty gas" equations have been used recently in a number of investigations by the authors[1] to model boundary-layer flows of dilute suspensions of heavy particles. Though none of the difficulties of well-posedness that so often occur in more complicated particle-laden flow models seems to arise for this equation set, what does nearly always appear, and is now well documented in a variety of boundary layers, is a wall singularity that occurs at a finite distance from the leading edge, where the volume fraction is unbounded. The dusty-gas approximation replaces the quantity "$1-\alpha$" everywhere in the particle-laden equations by "1". One is forced to seek a more complicated model in order to remove the unphysical singularity, and there are plenty of candidates–including particle pressure, added mass, particle-particle interactions. From the point of view of modifying the theory in the simplest possible way, we restore "$1-\alpha$" where it had been replaced by "1," and do nothing more. Such a procedure removes the singularity in boundary-layer flows, and we present computational and analytical results under such a change

[1]See, most recently, Foster, Duck & Hewitt (2006) *Proc. Roy. Soc A* **462**, 1145

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Date submitted: 02 Aug 2006 Electronic form version 1.4