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Is the kinetic equation for turbulent gas-particle flows ill-posed? MICHAEL REEKS, DAVID SWAILES, Univ of Newcastle, ANDREW BRAGG, Duke University — We examine recent claims that the kinetic equation for dispersed gas-particle flows has the properties of a backward heat equation and as a consequence, its solutions will in the course of time exhibit finite-time singularities. We show that the analysis leading to this conclusion is fundamentally incorrect because it ignores the coupling between the phase space variables in the kinetic equation and the time and particle inertia dependence of the phase space diffusion tensor. This contributes an extra +ve diffusion that always outweighs the contribution from the -ve diffusion associated with the dispersion along one of the principal axes of the phase space diffusion tensor. This is confirmed by a numerical evaluation of analytic solutions of these +ve and -ve contributions to the particle diffusion coefficient along this principal axis. We also examine other erroneous claims and assumptions made in previous studies that demonstrate the apparent superiority of the GLM PDF approach over the kinetic approach. In so doing we give a more balanced appraisal of the benefits of both PDF approaches.

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