



IFPRI Review Brief

Horizons in Dry Granular Modeling: Beyond DEM

The International Fine Particle Research Institute wishes to commission a comprehensive critical literature review of numerical methods for simulating the dynamics of dry particulate systems. IFPRI's membership is familiar with the discrete element method, and we have funded numerous projects and reviews of DEM, including an ongoing "round robin" project at the University of Birmingham that is exploring the accuracy of different DEM calibration approaches. However, for many of us, DEM is the *only* simulation method we know of for modeling kinematics and dynamics of granular systems. For this reason, we would like to commission a review of the state-of-the-art in modeling the dynamics of particulate systems *beyond DEM*.

The scope of the review is quite broad:

- Quasistatic through collisional flow regimes
- Soft through hard particles
- Non-cohesive through highly cohesive or adhesive particles
- Flows with and without interstitial gas
- General methods and techniques for particular scenarios, e.g., resistive force theory

Particle flows with interstitial liquids and Brownian systems are out of scope.

The primary audience for this review is the IFPRI membership, i.e., industrial scientists and engineers who are with some exceptions non-experts in simulations. Thus, the review should discuss the underlying principles, assumptions, and limitations of each technique. We hope that the review will eventually be published in the open literature.