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Title: Statistical Law of Turbulence in Granular Gas

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A novel description of granular gases from the viewpoint of ``statistical law of turbulence'' is presented. In our previous work[1], we noted the remarkable analogies with the statistical laws of decaying 2D NS turbulence in a granular gas, which is a well-defined simple IHS model with a deterministic thermostat(velocity scaling method). We obtained clear evidence for an enstrophy (square of vorticity) and cascade and -3 exponent in the Kraichnan-Leith-Bachelor energy spectrum by performing large-scale event-driven molecular dynamics simulations [2] in the quasi-elastic and thermodynamic limit. In recent calculations, we found that the enstrophy dissipation rate showed a strong relationship with the evolution of the exponent in the energy spectrum. A condensed state resembling Bose-Einstein condensation in decaying two-dimensional Navier-Stokes turbulence also appeared as the final attractor of the evolving granular gas in the long time limit. We also investigated the multi-million particles simulation in 3D IHS model and found that -5/3 exponent in energy spectrum, which is known as the famous Kolmogorov scaling. In this paper, we especially focus on the spatial correlations, such as the exponents of energy spectra, the microscale Reynolds number, and the minimal energy dissipation length and show several properties for the statistical law of turbulence in granular gas [3]. [1] M. Isobe: Phys. Rev. E, 68 (2003) 040301(R). [2] M. Isobe: Int. J. Mod. Phys. C, 10 (1999) 1281. [3] M. Isobe: in preparation.