Event driven simulation of a granular gas

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Abstract

This report summarizes a computational experiment where a two dimensional granular gas has been simulted in an event driven simulation.

1 Introduction

A granular gas is a two dimensional model in which a gas is represented by circular particles of finite radii and masses, that can collide elastically or inellastically. In this report, some results from simulations of suh a gas are given. The simulations show results that are in agreement with staatistical mechanics.

2 Theory

3 Results

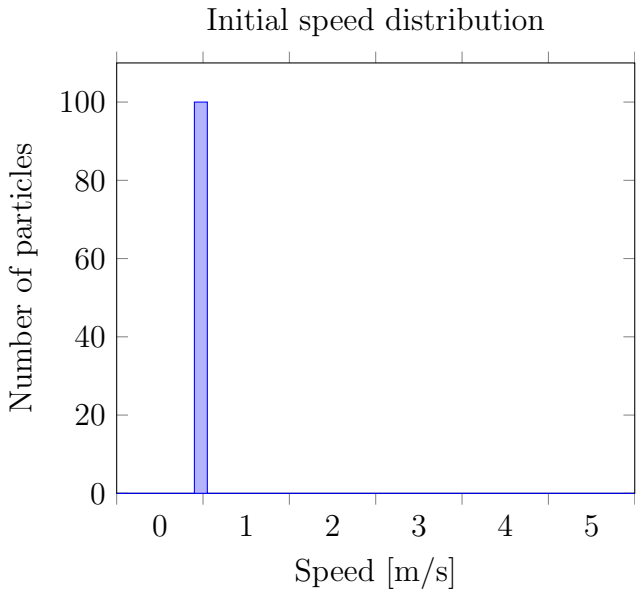


Figure 1: The initial speed distribution of the particles is a Dirac's delta function $\delta(v-1)$.

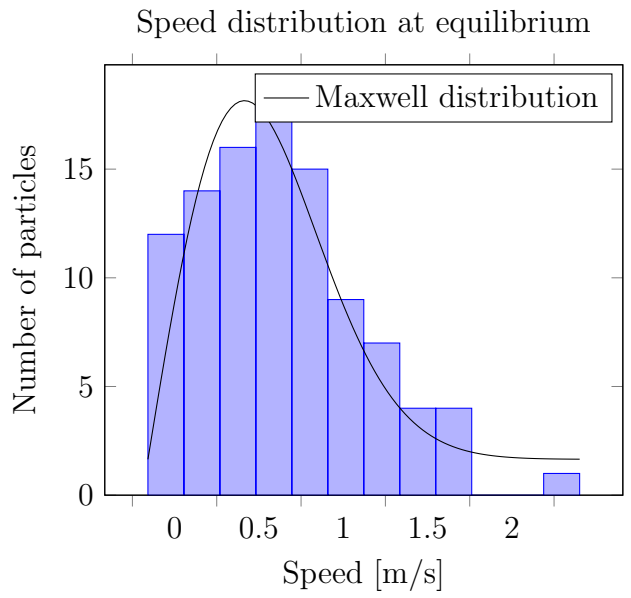


Figure 2: At equilibrium with $\xi = 1.0$, the speed distribution of the particles is a Maxwell distribution.

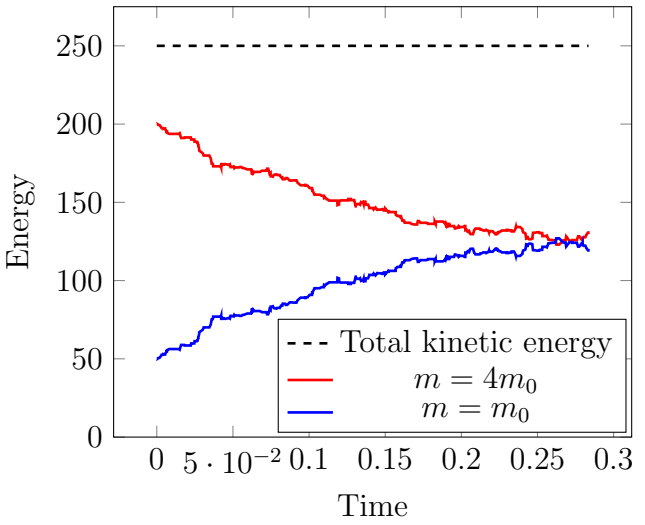


Figure 4: The figure shows the energy of the two subsystems (of different masses), as a function of time, with $\xi = 1.0$.

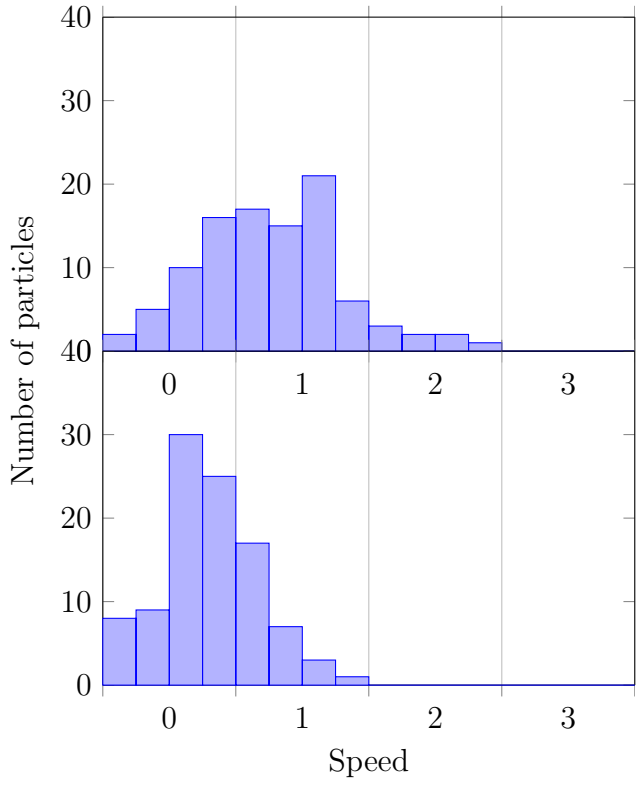


Figure 3: Histogram showing the speed distribution of a system containing equalt parts of two types of particles: One with mass $m = m_0$ (above), and one with mass $m = 4m_0$ (below).

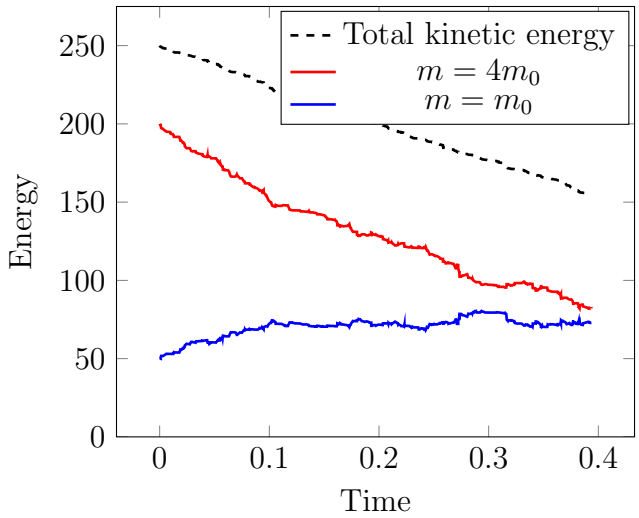


Figure 5: The figure shows the energy of the two subsystems (of different masses), as a function of time, with $\xi = 0.9$.

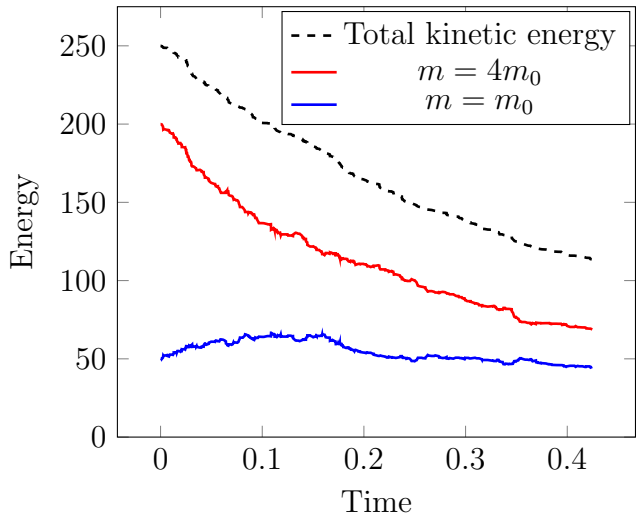


Figure 6: The figure shows the energy of the two subsystems (of different masses), as a function of time, with $\xi = 0.8$.

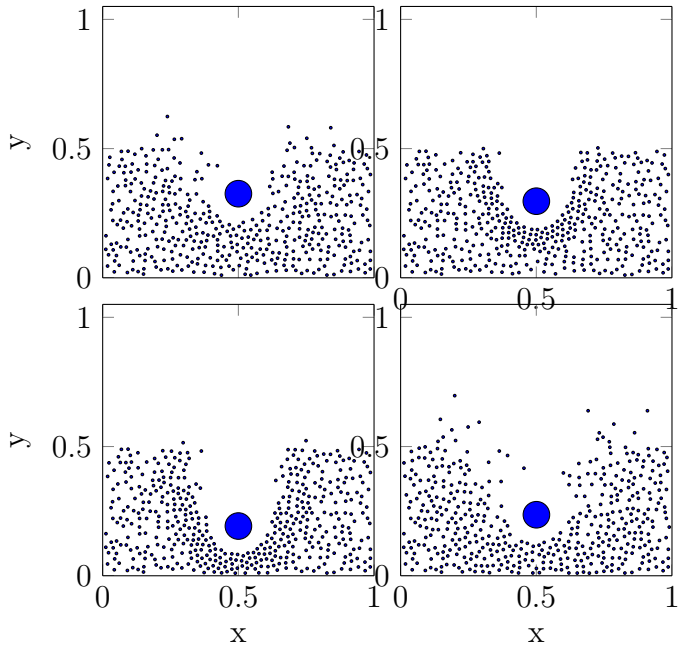
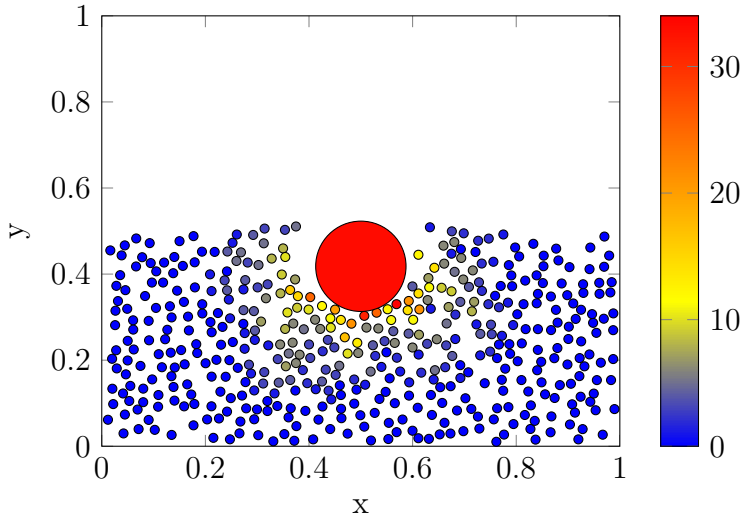


Figure 7: The crater formed by a particle colliding with a "wall" of smaller particles.



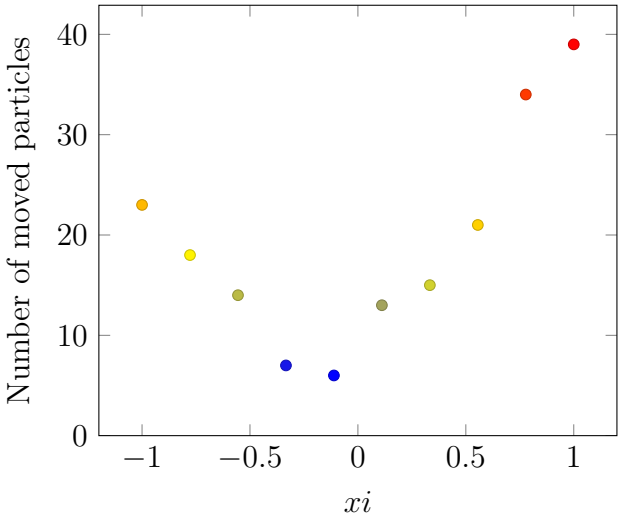


Figure 8