

and particle-piston collisions, but it seems to be independent of the mass of the piston, and v) the effective temperature can not be related in a simple way to the temperature of the granular gas; even more, the relationship between both parameters is not monotonic.

A relevant open question is the relationship between the granular temperature of the gas in the vicinity of the piston and the temperature parameter of the piston, the latter defined from the second moment of its velocity distribution. An explanation of the simulation results seems to require a detailed knowledge of the velocity distribution function of the gas next to the piston [14]. If this is the case, approximated solutions of the Boltzmann equation, as provided by instance by the Chapman-Enskog procedure in the first Sonine approximation, would not be of enough accuracy as to describe the deviation from equipartition between the gas and the movable piston.

The present study complements the one in ref. [14], in which the velocity fluctuations of the piston were investigated in detail. A natural issue now is whether the velocity fluctuations and the position fluctuations of the piston are correlated. We have computed from the simulation data the joint probability distribution for the position and velocity of the piston and compared it with the product of the marginal distributions for the position and the velocity. Both results agree within the statistical uncertainties, indicating the absence of correlations.

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### Appendix A

In ref. [19], an expression for the average position of the piston,  $L$ , was derived by using a hydrodynamic description of the granular with the appropriate boundary conditions. The theoretical prediction was showed to be in reasonable agreement with the simulation results. Although this expression could have been used to compute  $(\partial L / \partial M)_{v_W}$ , here this quantity has been obtained from the simulation data for the sake of consistency.

When trying to compute from the values of  $L$  as a function of  $M/m$  the derivative of