TABLE I: Third and fourth moments of the position distribution of the piston, obtained from the simulations. The position ℓ is given in the dimensionless scale defined in Eq. (6).

α	α_P	M/m	$< \ell^3 >$	$< \ell^4 >$
0.98	0.99	24	0.250	3.083
		60	0.172	3.190
		120	0.0385	2.898
	0.8	24	0.254	3.230
		60	0.136	3.047
		120	0.057	2.922
0.94	0.99	24	0.242	3.138
		60	0.125	2.996
		120	0.047	3.006
	0.8	24	0.145	2.964
		60	0.213	3.088
		120	0.101	2.985

parameters within the ranges mentioned above, although it seems that a small but systematic deviation shows up as the mass of the piston M becomes smaller, approaching the mass of the particles. A possible explanation for this behavior is that, as the mass of the piston decreases, the amplitude of its position fluctuations increases, and the effect of the external gravitational field breaks the symmetry of the fluctuations around the average position. To check this idea and to quantify the deviations from the Gaussian of the position fluctuations, the third and fourth moments of ℓ have been computed from the simulation data. The results for some of the simulations are given in Table I. For a Gaussian distribution it is $< \ell^3 >= 0$ and $< \ell^4 >= 3$. The deviations of the third moment from the Gaussian value are much stronger than those of the fourth one, supporting the idea that the main cause of the deviation from the Gaussian is due to the symmetry breaking produced by the external field, when the mass of the piston is not much larger than the mass of the particles. In any case, the deviations are rather weak and it can be concluded that, in the explored parameter region, the position fluctuations of the piston can be considered as Gaussian with a very good accuracy.