

Feed-back from Readers :

Discussion, Comments and Answers

From *poudres & grains* articles:

On *Poudres & grains* 14, 8-53 (2004) and *Poudres & grains* 13 (4), 40-73 (2002):

The dimension of the complete phase space of a single 3d ball in a vibrated box is not $11d$ but $13d$: Indeed, there are 3 degrees of freedom for space position and 3 for space rotation, then 6 others for their associated speeds, plus the time, since the excitation is time dependent. When the shape of the piston (or some other trick) is such as the ball is maintained in an imposed lateral position and its motion is periodic, its efficient phase space is reduced strongly, because the collision process can freeze efficiently 2 degrees of rotation and their speeds and 2 degrees of translation and their speeds, and because the ball speed in the direction of vibration is also determined and the ball position is linked to the piston position. For instance, the efficient phase space can become $1d$ to $4d$ if all speeds are frozen plus lateral position frozen depending on the number of degree of freedom of rotation. The space dimension is increased of 1 unit, *i.e.* from $3d$ to $5d$, if ball spinning in the direction of vibration remains free because solid friction for spinning is neglected. In some other cases, this leads to:

Case when the ball has a periodic motion with lateral speed negligible: the efficient phase space is $7d$, which is made of 3 degrees for position, 3 free angles and 1 spin speed; the degrees of freedom which are frozen are: 3 translation speeds and 2 rotation speeds, and time is fixed by the ball position.

Case when the ball has a periodic motion with lateral speed negligible but spinning is frozen: the efficient phase space becomes $6d$.

Case when the ball has a periodic motion with lateral speed negligible and a lateral position imposed by the piston shape: 2 more degrees are frozen. The efficient phase space becomes $4d$, which are 1 position (or time) and 3 angles.

P.E. from a remark by S. Aumaitre

On *Poudres & grains* 14, 54-80 (2004): on p. 63, at the end of the second paragraph, please read “active motion” instead of “passive motion”.

P.E.