

## Particle–wall collision – II

Equations for the particle conditions after sliding or non–sliding particle–wall collision (Tsuji, 1985) :

1. sliding collision for :  $-\frac{2}{7f(e+1)} \leq \frac{v_p^{(1)}}{|v_r|} \leq 0$  :

$$\begin{aligned} u_p^{(2)} &= u_p^{(1)} + \epsilon_x f (e + 1) v_p^{(1)} \quad , \\ v_p^{(2)} &= -e v_p^{(1)} \quad , \\ w_p^{(2)} &= w_p^{(1)} + \epsilon_z f (e + 1) v_p^{(1)} \quad , \\ \omega_x^{(2)} &= \omega_x^{(1)} - \frac{5}{d_p} \epsilon_z f (e + 1) v_p^{(1)} \quad , \\ \omega_y^{(2)} &= \omega_y^{(1)} \quad , \\ \omega_z^{(2)} &= \omega_z^{(1)} + \frac{5}{d_p} \epsilon_x f (e + 1) v_p^{(1)} \end{aligned}$$

2. non-sliding collision for :  $\frac{v_p^{(1)}}{|v_r|} < -\frac{2}{7f(e+1)}$  :

$$\begin{aligned} u_p^{(2)} &= \frac{5}{7} \left( u_p^{(1)} - \frac{d_p}{5} \omega_z^{(1)} \right) \quad , \\ v_p^{(2)} &= -e v_p^{(1)} \quad , \\ w_p^{(2)} &= \frac{5}{7} \left( w_p^{(1)} + \frac{d_p}{5} \omega_x^{(1)} \right) \quad , \\ \omega_x^{(2)} &= \frac{2}{d_p} w_p^{(1)} \quad , \\ \omega_y^{(2)} &= \omega_y^{(1)} \quad , \\ \omega_z^{(2)} &= -\frac{2}{d_p} u_p^{(1)} \end{aligned}$$

with :

$$|v_r| = \sqrt{\left( u_p^{(1)} + \frac{d_p}{2} \omega_z^{(1)} \right)^2 + \left( w_p^{(1)} - \frac{d_p}{2} \omega_x^{(1)} \right)^2}$$

and :

$$\epsilon_x = \frac{u_p^{(1)} + \frac{d_p}{2} \omega_z^{(1)}}{|v_r|} \quad , \quad \epsilon_z = \frac{w_p^{(1)} - \frac{d_p}{2} \omega_x^{(1)}}{|v_r|}$$

