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Erratum: Self-induced dust traps: overcoming planet formation barriers

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After publication of the paper ‘Self-induced dust traps: overcoming planet formation barriers’ in MNRAS 467, 1984 (2017), we discovered an inconsequential error in Appendix C.

Steady-state expressions of the radial velocities for both the gas and dust phases of a dusty disc, taking into account the back-reaction of dust on gas, have been calculated by several authors, for different conditions (e.g. Nakagawa et al. 1986; Kretke et al. 2009; Dipierro & Laibe 2017; Kanagawa et al. 2017). They are usually written as functions of the Stokes number for the gas-dust mixture St' and the dust-to-gas ratio $\epsilon = \rho_d/\rho_g$. In equation (C1), we gave the steady-state expression of the radial velocity of the viscous gas phase of a dusty disc as a function of the more commonly used Stokes number defined for the dust only, St , related to St' by $St' = St/(1 + \epsilon)$ (Price & Laibe 2015):

$$v_g = -f_{\text{drag}} \frac{1}{\Sigma_g \Omega} \frac{\partial}{\partial r} (c_s^2 \Sigma_g) + f_{\text{visc}} \frac{\partial}{\partial r} \left(\Sigma_g \nu r^3 \frac{\partial \Omega}{\partial r} \right), \quad (1)$$

$$\equiv v_{g,\text{drag}} + v_{g,\text{visc}},$$

where

$$f_{\text{drag}} = \frac{\epsilon}{(1 + \epsilon)^2 St^{-1} + St}. \quad (2)$$

When replacing St' by its expression as a function of St , we mistakenly wrote that $f_{\text{visc}} = 1$. The correct expression is

$$f_{\text{visc}} = \frac{(1 + \epsilon) St^{-1} + St}{(1 + \epsilon)^2 St^{-1} + St}. \quad (3)$$

As a consequence, equation (C10) should now read

$$x_{\text{br}} \equiv \frac{|v_{g,\text{drag}}|}{|v_{g,\text{visc}}|} \approx \frac{1}{\alpha} \frac{f_{\text{drag}}}{f_{\text{visc}}}, \quad (4)$$

and Fig. C1 should be replaced with the current Fig. 1. It shows that both f_{visc} and x_{br} are little affected for small values of ϵ . For $\epsilon \sim 1$, the effect of back-reaction on the gas phase is up to twice as large, strengthening the conclusions of the initial study.

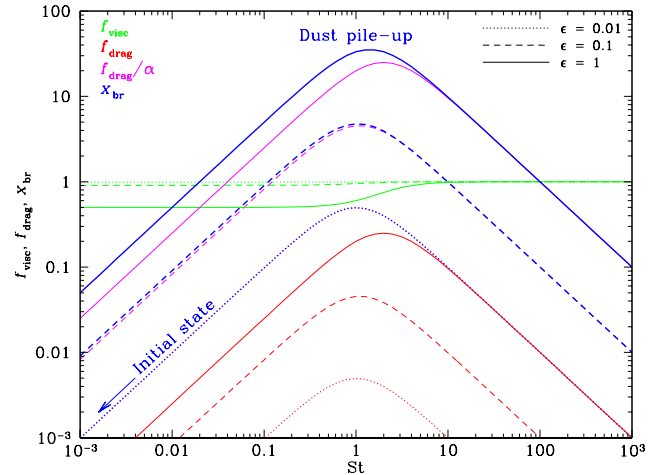


Figure 1. Parameter x_{br} , quantifying the importance of back-reaction on the gas motion, as well as f_{drag} and f_{visc} , as a function of St , for $\epsilon = 0.01, 0.1$ and 1 , and $\alpha = 10^{-2}$.

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