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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 $\epsilon = \rho_\mathrm{d}/\rho_\mathrm{g}$. 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 $\mathrm{St}' = \mathrm{St}/(1+\epsilon)$ (Price & Laibe 2015):

$$v_\mathrm{g} = -f_\mathrm{drag}\frac{1}{\Sigma_\mathrm{g}\Omega}\frac{\partial}{\partial r}\left(c_\mathrm{s}^2\Sigma_\mathrm{g}\right) + f_\mathrm{visc}\frac{\dfrac{\partial}{\partial r}\left(\Sigma_\mathrm{g}\nu r^3\dfrac{\partial\Omega}{\partial r}\right)}{r\Sigma_\mathrm{g}\dfrac{\partial}{\partial r}\left(r^2\Omega\right)}, \quad (1)$$
$$\equiv v_\mathrm{g,drag} + v_\mathrm{g,visc},$$

where

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

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

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

As a consequence, equation (C10) should now read

$$x_\mathrm{br} \equiv \frac{\left|v_\mathrm{g,drag}\right|}{\left|v_\mathrm{g,visc}\right|} \simeq \frac{1}{\alpha}\frac{f_\mathrm{drag}}{f_\mathrm{visc}}, \quad (4)$$

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.

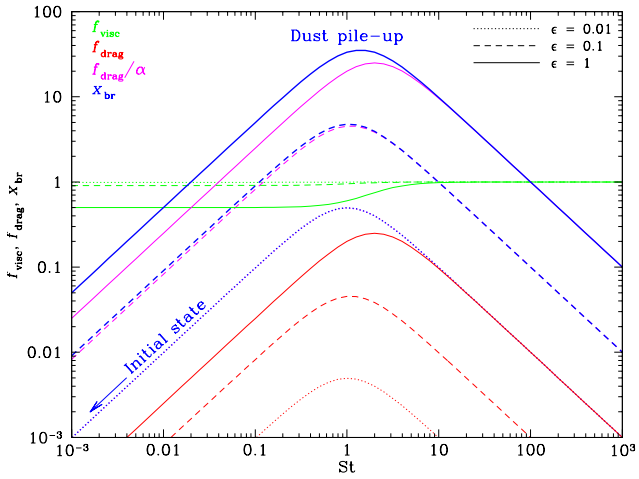

Figure 1. Parameter x_br, quantifying the importance of back-reaction on the gas motion, as well as f_drag and f_visc, as a function of St, for $\epsilon = 0.01$, 0.1 and 1, and $\alpha = 10^{-2}$.

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