The flapping states of a flag in an inviscid fluid: bistability and the transition to chaos

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In our letter [1], an error was made in the computation of the nondimensional flag mass $R_1 = \rho_s/\rho_f L$ and dimensionless rigidity $R_2 = B/\rho_f U^2 L^3$. Here ρ_s is flag mass per unit length, ρ_f is fluid mass per unit area, B is flag bending rigidity and U is the fluid stream speed. L is defined as the flag length, but R_1 and R_2 in [1] were computed using only the half flag length $L/2$ in place of L. Therefore the values of R_2 in [1] are a factor of 8 too large (due to the factor of L^3), and the values of R_1 are a factor of 2 too large.

Figure 1 is a revised version of Figure 2 in [1] comparing the stability boundary with those of recent studies by [2, 3] and [4] (Fig. 3, dashed-dotted line in that work). The correction moves our boundary considerably closer to the others.

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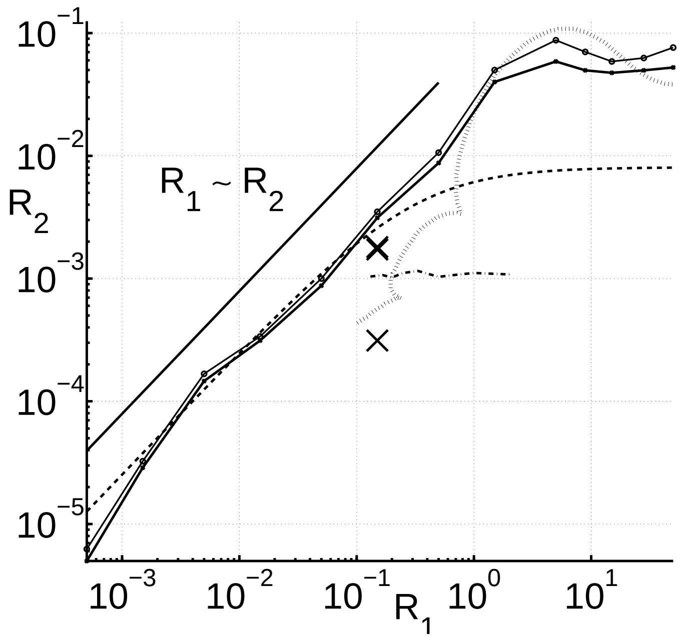

FIG. 1: Computed stability boundary in the R_1R_2-plane. The upper solid boundary gives the smallest R_2 above which a small leading-edge forcing ($y(t) = 10^{-5}(2t)^2e^{-(2t)^2}$) does not lead to flapping. The lower solid boundary is the largest R_2 below which such forcing leads to exponential growth of elastic energy in time until the flag saturates with $O(1)$ flapping, as shown in Figs. 1 and 2 of [1]. The solid line gives the scaling $R_1 \sim R_2$ for comparison at small flag masses. The black crosses mark the cases shown in Fig. 2 of [1] (upper cross is (a) and (b), and lower is (c)). The dashed line shows the stability boundary from [2], and the dash-dotted the corresponding boundary plotted in Fig. 3 of [3] (showing only the portion $R_2 \approx$ constant, but having the same asymptotic scalings as the model here and in [2]). The dotted line (with cusps) is the 2D result from the model of [4].