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ERRATUM

Polygon formation and surface flow on a rotating fluid surface – ERRATUM

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Our recent paper Bergmann *et al.* (2011) on polygon states on a rotating fluid surface contained a few typographical errors as well as an imprecise statement about the feasibility of point vortex models for the flows under consideration. In the following, we shall correct these shortcomings.

(*a*) In (4.1) on p. 422, there is a superfluous R, and r_v should have been R_v – the distance of the vortex from the rotation axis. The equation should thus read

$$\Omega = \frac{\Gamma}{2\pi R_v^2} \approx 0.26\,\frac{\mathrm{rad}}{\mathrm{s}}. \tag{4.1}$$

In the calculations, the correct formula was used, so the result of (4.1) remains valid. Two lines above this equation, r_v also appears and again it should be replaced by R_v.

(*b*) At the bottom of page 421 we write: 'it has been speculated that the flow may be described by a simple point vortex model; see Vatistas et al. (2008)'. Having identified three point-like vortices on the fluid surface, we compute (using (4.1)) the rotation rate of three point vortices in an otherwise irrotational 2d fluid, and conclude that it is an order of magnitude smaller than the observed rotation rate. We then continue: 'refining the model by introducing image counter-rotating vortices outside the cylinder so as to satisfy the no-penetration boundary condition at the cylinder wall does not improve matters much. The inclusion of image vortices leads to a relative increase of the predicted angular velocity (4.1) by about 30 %, which is still far too low. Thus the motion of the vortices is only to a small degree influenced by the advection from the other vortices and must be subjected, in addition, to a strong background velocity field. A Hamiltonian model of point vortices in an otherwise potential flow would capture neither the observed rotation velocities nor the spiralling effects seen in figure 9'.

The last statement is somewhat sweeping. We can of course not conclude that a general point vortex model is not feasible. All we can say is that a point vortex model with only $N = 3$ point vortices (plus images) in an otherwise irrotational flow is insufficient to account for the flow or the rotation rate of the polygon. Other vortices, e.g. a strong central vortex, might be necessary. To substantiate this, it would have been helpful to include additional data from our surface flow measurements, and we

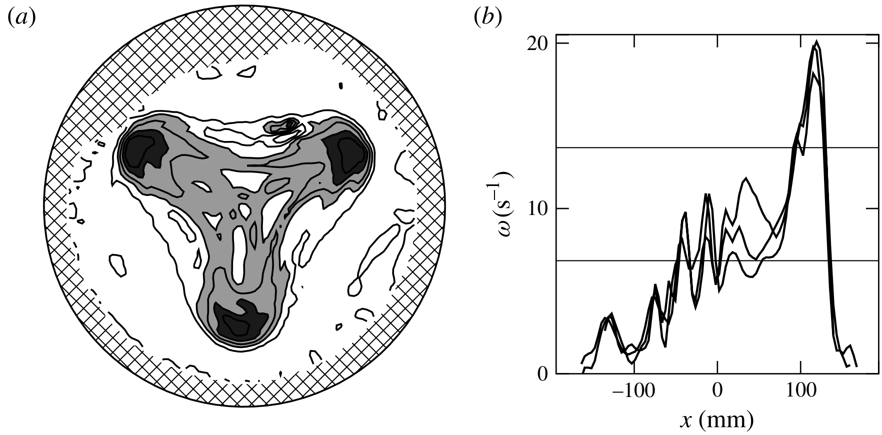

FIGURE 1. (*a*) Vorticity contours in the lab frame. Each of the 'point' vortices have strengths around 0.025 m^2 s^{-1}, where the sign of ω is chosen as positive for clockwise rotation. Their centers are 110 mm from the center of the container (the rotation axis) and their radii are around 20 mm. The circulation inside a disk of radius 90 mm (the 'inner area') is around 0.18 m^2 s^{-1}, which corresponds well to the observed rotational velocity of the triangle-shaped surface deformation. The contour lines show levels of ω in units of $\omega_{max}/6$. The light grey areas have $2\omega_{max}/3 > \omega > \omega_{max}/3$ and the dark grey has $\omega > 2\omega_{max}/3$, where $\omega_{max} = 20.5$ s^{-1}. (*b*) Clockwise vorticity in the lab frame as function of distance (in mm) from the rotation axis on a ray passing through a vortex to the right and the midpoint between two vortices on the left. The three different curves each pass through one of the three different vortices. The vorticity is computed from the data used for figures 7–9 in Bergmann *et al.* (2011) and a slight spatial smoothing has been applied.

shall amend this by showing the present figure 1. The figure shows (*a*) the vorticity ω (in the lab frame) on the entire fluid surface and (*b*) the vorticity as function of distance from the rotation axis on the three rays passing through the centres of the vortices. The three point-like vortices are clearly visible and have a vorticity of the order of twice the largest vorticity elsewhere. In addition, there is a 'plateau' of vorticity between the rotating vortices, whereas the vorticity is basically zero outside. Whether this can be successfully modelled in terms of point vortices, will be left to the judgement of the readers and future researchers.

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