CORRIGENDUM

Unsteady Lagally theorem for multipoles and deformable bodies

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In this paper expressions were derived for the hydrodynamic force and moment acting on a deformable body moving with six degrees of freedom in an arbitrary, ambient, irrotational flow of an inviscid incompressible fluid, including the effects of multipoles within the body. An assumption which greatly simplified the derivation, stated on p. 36, is 'At this stage we may select S_0 to be a sphere of radius R_0 and volume $\forall_0$ about the singularity (x_s, y_s, z_s) as centre.' This assumption, which was used to determine the residues of various integrals containing multipole singularities, has been found to be invalid in many cases.

The cause of the failure is that the assumption violated the independence of the multipole co-ordinates from the field co-ordinates. This was corrected by displacing the centre of the sphere S_0 from the singular point and applying the theory of spherical harmonics to evaluate the required integrals.

A typical case is that for equation (19), viz.

$$\int_{S_0} (\mathbf{v}' \times \mathbf{n}) \times \mathbf{u}_q \, d\mathscr{S}_0 = -\frac{8\pi}{3} P_{uq} D_s^q(\mathbf{v}')_s,$$

in which q is the order of the multipole. After correction, the factor $8\pi/3$ is replaced by $4\pi(q+2)/(2q+3)$, which agrees with the original result only when $q = 0$.

All the equations which require correction occur in section 2 of the paper. Fortunately, the specific results in this section which are required in the derivation of the force and moment formulae are either unaltered or combine so that the resulting expressions for the force and moment are not affected.

A complete set of corrections and some of their derivations are available and will be furnished upon request from Prof. L. Landweber (Institute of Hydraulic Research, University of Iowa, Iowa City, Iowa 52242).