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ADDED MASS FOR MOTION IN STRATIFIED FLUIDS

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Boundary forcing is a common way of producing internal gravity waves in a density-stratified fluid; examples include internal tides in the ocean and lee waves in the atmosphere. As a generation mechanism, this type of forcing is conveniently accounted for by distributing singularities over the boundary. The distribution of singularities is determined from the resolution of an integral equation expressing continuity of the normal velocity. Two approximations have been introduced, based on the largeness of the internal Froude number representing the ratio of inertia to buoyancy. The first approximation (Miles 1971) neglects (i) the influence of the stratification over the forcing region and (ii) the size of this region; the second approximation (Gorodtsov & Teodorovich 1982) neglects factor (i) but retains factor (ii). Both approximations imply ignoring the modification of the added mass of the forcing area by the stratification. In this communication we study the generation of internal waves by oscillating spheres, comparing the exact linear solution to the outcome of the preceding two approximations; emphasis is on the influence of stratification on added mass. Mathematical methods include complex coordinate transformation and expansion in oblate spheroidal harmonics.

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