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Hydrodynamics of contact of larvae of marine invertebrates with solids GREGORY ZILMAN, JULIA NOVAK, YEHUDA BENAYAHU, Tel Aviv University, School of Mechanical Engineering, Dept. of Fluid Mechanics — Attachment of larvae of marine invertebrates to solids is a fundamental phenomenon in marine ecology. The mechanism of initial contact of larvae with solids is a part of this phenomenon and a long-standing question of larval behavior. Marine larvae are transported to a solid along fluid streamlines, which do not cross the surface of the solid. However, neutrally buoyant and approximately spherical motile larvae do make contact with solids even in unidirectional laminar flows, for instance, in fully developed laminar tube flows, where neutrally buoyant spherical particles concentrate between the wall and the tube's axis. A new mathematical model explaining this controversy is proposed. The flow vorticity and larval locomotion are the key components of the hydrodynamic model. The motion of larvae is studied theoretically in a linear shear, the Couette, the Poiseuille and the Blasius boundary layer flows. Larvae trajectories and the contact probability are calculated. It is demonstrated that the contact probability depends on the flow enstrophy and larvae swimming velocities. The theoretical results compare favorably with available experimental data.

Gregory Zilman
Tel Aviv University

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