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Piston Impact Onto the Boundary of Two-Layer Fluid

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The plane unsteady problem of fluid flow caused by impact onto its boundary is considered. Initially fluid is at rest and occupies a lower half-plane. The fluid consists of two horizontal layers with different densities and sound velocities. Displacements of the upper boundary are prescribed. The fluid flow is described within the acoustic approxima-tion. This approximation is valid for impact speeds well below the me-dium's sound velocity and for times, when displacements of the rigid boundary are small compared to the thickness of the upper layer. For the special case of practical importance, when impact velocity is a step function, both the velocity potential and the distribution of hydro-dynamic pressure along the upper boundary of the fluid are obtained in the forms of series at any time instant. This allow us to study peculiari-ties of the impact process for different parameters of the liquid layers.

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