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## Sloshing

Liquid sloshing must be considered for almost any moving vehicle or structure containing a liquid with a free surface and can be the result of resonant excitation of the tank liquid; primary practical interest is excitation of the lowest natural sloshing frequency. The original mathematical statements deal with the free-surface nonlinear boundary problems whose solution is, generally speaking, not unique. A broad variety of Computational Fluid Dynamics (CFD) methods exists, whereas analytical approximate approaches are rare exceptions in the literature.

Based on our recent book [1], we overview these approaches as well as new mathematical problems giving rise from marine and land-based applications, with a focus on ship tanks, where sloshing can be very violent and slamming and coupling between sloshing and ship motions are important aspects.

An emphasis is placed on rational and simplified approximate methods and approaches to classical sloshing problems as well as on a series of new non-classical mathematical problems appearing, for instance, to describe transient sloshing in spherical and horizontal circular cylindrical tanks, the effect of tank deformations, wave-induced hydroelastic analysis of a monotower, flow through screens and swash bulkheads, pumping sloshing in moonpools, etc. Whenever possible, simple semi-analytical particular solutions of these problems are given.

- [1] Faltinsen, O., Timokha, A. Sloshing. — Cambridge: Cambridge University Press, 2009.
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