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THE NUMERICAL SOLUTION OF THE AXIALLY SYMMETRIC LINEAR SLOSHING PROBLEM BY THE BOUNDARY INTEGRAL EQUATION METHOD

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ABSTRACT. This paper is devoted to the numerical solution of the axially symmetric linear sloshing problem. A mathematical model of linear sloshing in a tank filled by an inviscid incompressible liquid is considered. The problem is rewritten as a linear evolution problem on a free surface with an operator coefficient. First, by Laguerre transformation with respect to time, we reduce the non-stationary problem to a sequence of operator equations. Then, using potential theory for the Laplace equation in a bounded domain with corners, a system of boundary integral equations of the second kind is obtained. Taking into account the axial symmetry, we obtain a system of one-dimensional integral equations of the second kind, the kernels of which are represented through the use of complete elliptic integrals of the first and second kinds. A non-linear mesh grading transformation is used to weaken the density singularities. The logarithmic singularity is avoided as well. The full discretization is realized by a Nyström method and results of numerical experiments are presented.

1. Introduction and Problem Statement. Sloshing is a free surface flow problem in a tank, which is subjected to forced oscillations. In this paper we deal with an unsteady potential flow of an inviscid incompressible liquid having a free surface, in a uniform gravitational field. This problem is rewritten and considered by us as an evolution problem. The additional complexity of the problem is the time dependence of the process. For the temporal discretization we use the Laguerre transformation [**1, 2**]. The obvious advantage of the Laguerre

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