Секция «Дифференциальные уравнения, динамические системы и оптимальное управление»

Asymptotics of the 1D shallow water equations in the form of running waves in a basin with variable bottom with vertical and gentle walls

Научный руководитель – Миненков Дмитрий Сергеевич

Вотякова Мария Михайловна
Student (master)
Московский физико-технический институт, Москва, Россия
E-mail: votiakova.mm@phystech.edu

The Cauchy problem for the one-dimensional shallow water equations with variable bottom D(x) and localized initial data is considered [1]. The domain under consideration is confined by a vertical wall on the right, where the Neumann conditions are set, and a movable border on the left. An asymptotics of the Carrier-Greenspan transform is used to get equations with fixed boundaries and small nonlinear terms, which allows to construct (formal) asymptotics to the initial problem [2]. Wave profile changes and its relation to the Maslov index [3] are of interest. The work is supported by grant RSF 21-11-00341. The authors are grateful to S.Y. Dobrokhotov, V.E. Nazaikinsky and A.I. Shafarevich for their support and valuable discussions.

References

1) E.N. Pelinovskii, Hydrodynamics of Tsunami Waves, IPF RAN, Nizhnii Novgorod, 1996.

2) S.Yu. Dobrokhotov, D.S. Minenkov, and V.E. Nazaikinskii, Asymptotic Solutions of the Cauchy Problem for the Nonlinear Shallow Water Equations in a Basin with a Gently Sloping Beach Russian Journal of Mathematical Physics, 29(1) 28–36 (2022).

3) V.P. Maslov, M.V. Fedoryuk, Quasi-classical approximation for the equations of quantum mechanics, Nauka, Moscow, 1976.