INTERNATIONAL CONFERENCE

DAYS ON DIFFRACTION 2015

ABSTRACTS

May 25 – 29, 2015

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where $\Omega \in \mathbb{R}^3$ is a bounded domain. The pressure function $p(\rho)$ is positive and strictly increasing. The initial data are close to the equilibrium state, i.e.,

$$\|\boldsymbol{v}_0\|_{W_2^{1+l}(\Omega_0)} + \|\rho_0 - \bar{\rho}_0\|_{W_2^{l+1}(\Omega_0)} \ll 1,$$

where $1/2 < l < 1$ and $\bar{\rho}_0$ is the mean value of the density. We prove that the problem is uniquely solvable in the infinite time interval $t > 0$ and the solution decays exponentially in the Sobolev norms, as $t \to \infty$. The proof is based on the "free work" method due to M. Padula [1] (estimate of an auxiliary function of Lyapunov type) combined with the classical method of localization. It permits to avoid the analysis of explicit solution for the model problems in the whole space and in the half-space. It is also applicable to some free boundary problems.

References

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Analytical regularization of a generalized eigenwave problem for weakly guiding step-index optical fibers by Muller boundary integral equations

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Muller boundary integral equations (BIEs) are reliable and efficient tools for analysis of the electromagnetic field in the presence of a 2D homogeneous dielectric object with an arbitrary smooth boundary [1]. Particularly, Muller BIEs were used in [2] for numerical calculations of surface eigenwaves of weakly guiding step-index optical fibers. In present work we solve a generalized eigenwave problem on surface and leaky natural waves of such fibers and perform analytical regularization [3] of this problem. We prove that the original problem for Helmholtz equation on the plane with Reichardt radiation condition is equivalent to a nonlinear eigenvalue problem for Muller BIEs with compact operator. We prove a theorem on spectrum localization of propagation constants on an appropriate Riemann surface, and also prove that the set of all eigenvalues of the obtained operator-valued function can be only a set of isolated points on the Riemann surface. Each eigenvalue depends continuously on nonspectral parameters and can appear and disappear only at the boundary of this surface. The integral operator we approximate by a spline-collocation method. The convergence and quality of the numerical method we confirm by numerical experiments.

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Real-time computer visualization of dynamic fluid jets

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In this article is considered the problem of developing an efficient algorithm and its optimization for visualization of fluid jet in dynamics. Visualization is done by approximating the desired surface