Olena Atlasiuk

On generic boundary-value problems for differential systems in Sobolev spaces

For the systems of ordinary differential equations of arbitrary order on a compact interval, we study a character of solvability of the most general linear boundary-value problems in the Sobolev spaces W_p^n, with $n \in \mathbb{N}$ and $1 \leq p \leq \infty$. We find the indices of these Fredholm problems and obtain a criterion of their well-posedness. Each of these boundary-value problems relates to a certain rectangular numerical characteristic matrix with kernel and cokernel of the same dimension as the kernel and cokernel of the boundary-value problem. The condition for the sequence of characteristic matrices to converge is found. We obtain a constructive criterion under which the solutions to these problems depend continuously on the small parameter ε at $\varepsilon = 0$, and find the degree of convergence of the solutions. Also, applications of these results to multipoint boundary-value problems are obtained.

1. Atlasiuk, O. M.; Mikhailets, V. A. Fredholm one-dimensional boundary-value problems in Sobolev spaces. Ukrainian Math. J. 70 (2019), no. 10, 1526–1537.

2. Atlasiuk, O. M.; Mikhailets, V. A. Fredholm one-dimensional boundary-value problems with parameter in Sobolev spaces. Ukrainian Math. J. 70 (2019), no. 11, 1677–1687.

3. Atlasiuk, O. M. Limit theorems for solutions of multipoint boundary-value problems in Sobolev spaces. J. Math. Sci. 247 (2020), no. 2, 238–247.