On Linear Inhomogeneous Boundary-Value Problems for Differential Systems in Sobolev Spaces

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For the systems of ordinary differential equations of an 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 $\varepsilon$ at $\varepsilon = 0$, and find the degree of convergence of the solutions. Also applications of these results to multipoint boundary-value problems are obtained.

