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Section:

5. Differential Geometry and Global Analysis

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Methods of global analysis in problems of solvability of nonlinear equations and inclusions.

Modern nonlinear functional analysis is essentially based on methods of global analysis and topology. The new introduced by the author class $\Phi_n C^1 M_B$ of vector fields $f : (X, \partial X) \to (E, E \backslash 0)$ is considered, where $f = A - g$ is a nonlinear proper map, $A \in \Phi_n C^1, n \geq 0$, $g \in K_V$ is semicontinuous above with convex compact images, and the pair (A, g) is completely fundamentally restricted. Here X is a Banach manifold with a boundary ∂X of class C^1 with oriented Fredholm structure X_Φ induced by A from Banach space E with trivial Φ-structure. For the map $f \in \Phi_n C^1 M_B$ we define topological characteristics $deg\, f \in F_n$, $\widetilde{deg}\, \tilde{F}_n$ as oriented degrees with values in classes of the Elworthy-Tromba n-bordisms characterizing a set of coincidences $S(A, g)$ of inclusions $A(x) \in g(x)$. Also we consider applications for the control problem of dynamical system with functional relations and for nonlinear Dirichlet's problem in a narrow strip.

Reference: Yu. G. Borisovich. Global analysis of operator equations arisen in singular problems of optimization, *Dokl. Acad. Nauk RAN*, **355** (1997), 11-13.