

# Homotopy invariants detecting global bifurcations of solutions to multiparameter differential problems

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Most of the parameterized boundary value problems for differential equations or inclusions lead to the system

$$\begin{cases} Du \in \psi(\lambda, u) \\ l(u) = b(\lambda, u), \end{cases}$$

where  $\lambda \in \Lambda \subset R^k$  is a parameter,  $D$  is a differential operator defined on a suitable function space  $\mathbf{E}$ ,  $\psi$  is a nonlinear (possibly set-valued) perturbation,  $l : \mathbf{E} \rightarrow R^k$  is a linear map and  $b : \Lambda \times \mathbf{E} \rightarrow R^k$  is a nonlinear map.

We introduce two homotopy invariants: bifurcation index and Alexander-type invariant responsible for the existence of a connected branch of solutions to the above problem emanating from the set of its ‘trivial’ solutions like in the classical result of Rabinowitz. We give some concrete examples and compare the problems with one- and multidimensional parameter.

## References

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