Commentary on the habilitation thesis

"Parametrisation methods for constructive analysis of boundary value problems for ordinary differential equations"

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This thesis is a commented collection of the papers [1–8] dealing with the constructive investigation of boundary value problems for systems of ordinary differential equations. The method uses Lyapunov-Schmidt type reductions and successive approximations. It is constructive in the sense that it allows one both to explicitly obtain approximate solutions and to use the results of computation in the solvability analysis. The existence theorems involve conditions that use the properties of finitely many iterations and can be verified directly.

Our aim here is the extension and development of the previously available related techniques in several directions. We suggest a new approach allowing one to construct a convergent iteration procedure for boundary value problems for systems with large non-linearities (i.e., those not satisfying typically assumed smallness conditions). The method is rather flexible and, as is shown, can be adopted for application to a wide range of problems.

The papers included in the thesis have coauthors. All the coauthors contributed equally to these works ([1, 3, 4]: 25%, [2, 5–8]: 33%); the author essentially contributed to their preparation at every stage including research conceptualisation, main investigation, and writing.

References

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[8] A. Rontó, M. Rontó and N. Shchobak. 'Constructive analysis of periodic solutions with interval halving'. *Bound. Value Probl.* (2013). 2013:57, 1–34.