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A Gauss-Newton continuation method for singular parameter-dependent boundary value problems using bvpsuite 2.0

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Abstract

We present a numerical continuation method for the solution of boundary value problems (BVPs) in ordinary differential equations which depends on a free parameter. This method incorporates the open-source `bvpsuite 2.0` package [1] for MATLAB in a Gauss-Newton continuation method [2]. The `bvpsuite 2.0` package utilizes polynomial collocation [3] equipped with adaptive mesh selection for the solution of boundary value problems. By solving for the free parameter simultaneously with the collocation solution of the BVP, the continuation method is able to cope with turning points in the solution-parameter space. We test our proposed methods on benchmark problems to demonstrate its efficiency.

References

References

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