

A note on SINGLE-ITERATION SOBOLEV DESCENT FOR LINEAR INITIAL VALUE PROBLEMS

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Abstract

Mahavier and Montgomery construct a Sobolev space for approximate solution of linear initial value problems in a finite difference setting in SINGLE-ITERATION SOBOLEV DESCENT FOR LINEAR INITIAL VALUE PROBLEMS, Mahavier, Montgomery, MJMS, 2013. Their Sobolev space is constructed so that gradient-descent converges to a solution in a single iteration, demonstrating the existence of a best Sobolev gradient for finite difference approximation of solutions of linear initial value problems. They then ask if there is a broader class of problems for which convergence in a single iteration in an appropriate Sobolev space occurs. We use their results to show the existence of single-step iteration to solution in a lower dimensional Sobolev space for their examples and then a class of problems for single-step convergence.

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