

# Ideas about a Multi-level Parareal Method

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## Abstract

Modern computing architectures become increasingly powerful. To exploit their potential, when solutions to time evolution problems are needed, Parallel-in-time methods, like the Parareal method, can be applied. The Parareal method is a two-level method with a coarse and a fine time grid. Variants of the Parareal method including averaging have been studied. It is possible to extend the method to more than two levels. The increase in the number of levels might be advantageous, as it comes along with increased parallelism and possibly more efficient algorithms. The extension to more than two levels requires a modification of error estimates. In addition, it must be discussed for which types of problems applying a Multi-level Parareal method has advantages over the two-level method.

**Keywords**— Parareal method, Multi-level methods