
Parareal in Time Simulation for Partial Differential Equations

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Numerical simulation of time dependant problems on complex geometries is still a challenging task. In a context of fast increasing in both the CPU power available on typical workstations and of the number of computers that can be connected through high speed networks, the difficulty resides rather in how to obtain “real time solutions” than in the amount of CPU power available (which becomes to exceed the needs). In this direction, domain decomposition and splitting techniques is interesting but not enough.

In this context, the “parareal” algorithm that parallelize **in the time direction** the work required to solve the evolution equations will be presented on many illustrative examples. This method is based on the alternative use of coarse global sequential solvers with fine local parallel ones.

A rewriting of the time scheme in a matrix form can be presented that allows for an application to control of phenomenon governed by parabolic type equations.