Multigrid Method

Fast Iterative Solvers, Project 2

Johannes Leonard Grafen, 380149

July 19, 2023

Contents

List of Figures

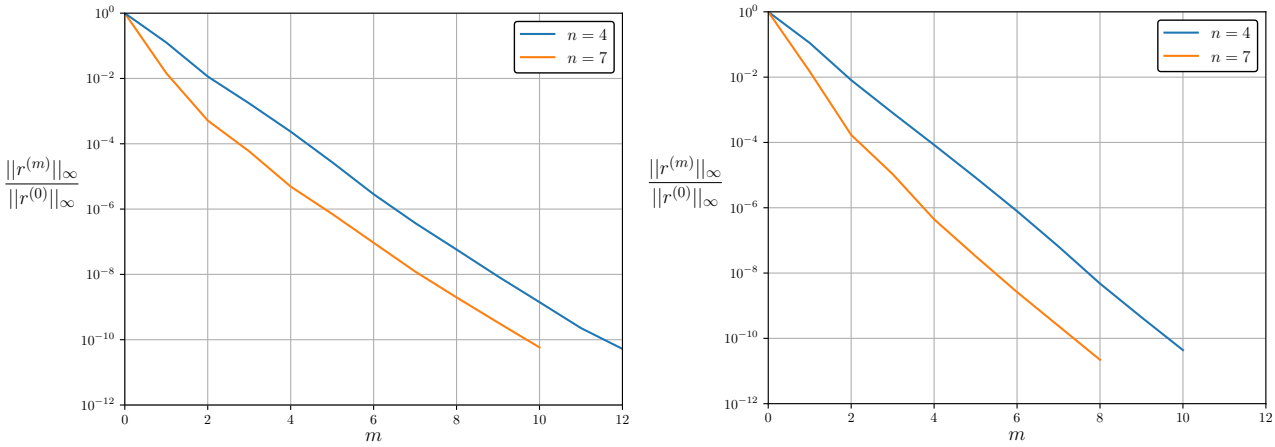
List of Tables

1 Remarks on used architecture and compiler options

The code was written in C++, compiled using the Clang compiler and executed on an Apple Silicon M1 Pro Chip featuring the ARM64 architecture. To measure timings, the high resolution clock of the std chrono library was employed. The following flags where passed to the compiler to enhance code performance of the aforementioned architecture: -march=native, -O2.

2 Multigrid Method - MG

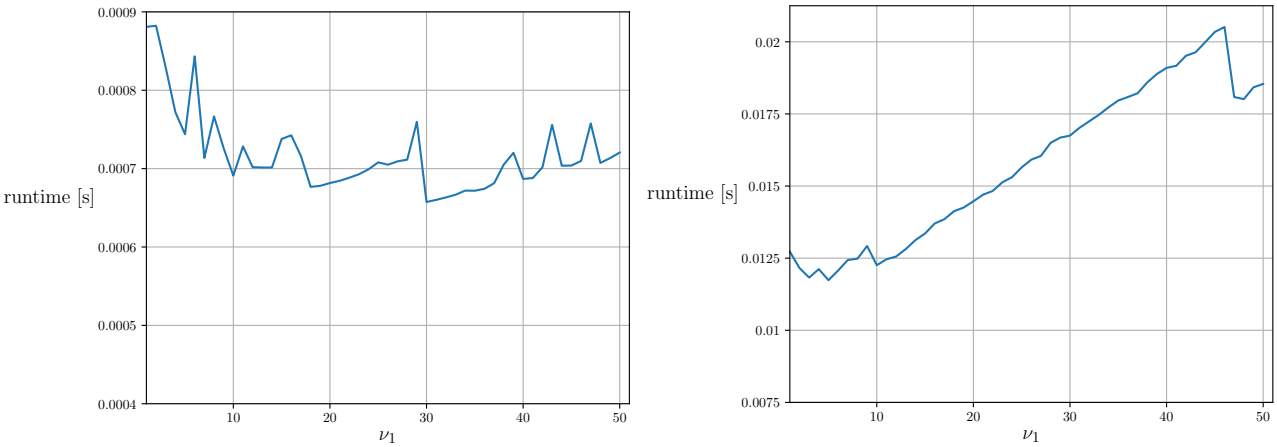
2.1 Convergence Plots



(a) $\nu_1 = \nu_2 = 1$ (b) $\nu_1 = 2, \nu_2 = 1$

Figure 1: Convergence against multigrid iterations m for meshes $n = 4$ and $n = 7$

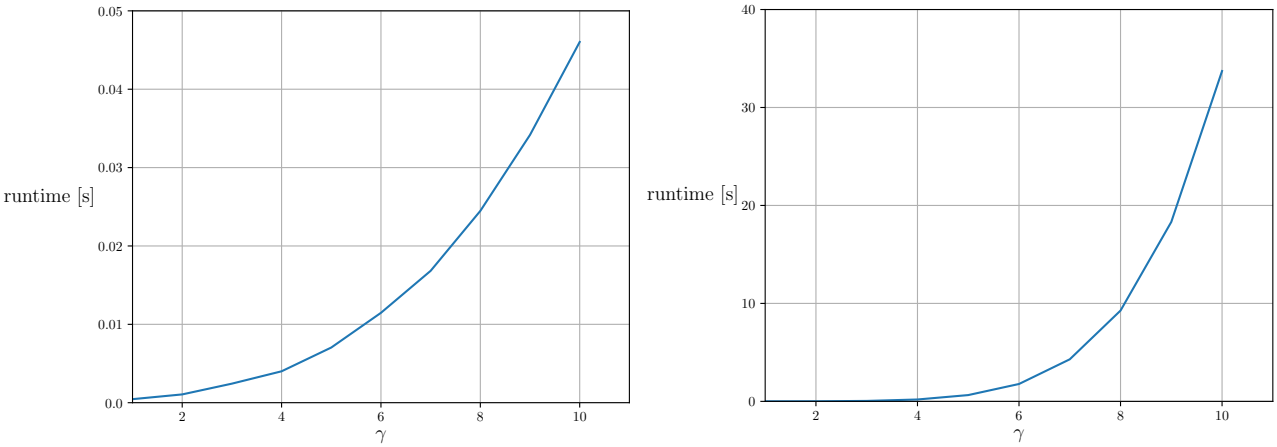
2.2 Convergence for different ν_1



(a) $n = 4$ (b) $n = 7$

Figure 2: Runtime against number of smoothing iterations $\nu_1 = 1...50$ for meshes $n = 4$ and $n = 7$

2.3 Convergence for different γ



(a) $n = 4$ (b) $n = 7$

Figure 3: Runtime against number of γ-cycles for $\gamma = 1...10$ for meshes $n = 4$ and $n = 7$