Multigrid methods

- The web page, link `Multigrid methods`:
  link `http://msekce.karlin.mff.cuni.cz/~dolejsi/Vyuka/NS_source/MG/index.html`
  files: MG.f90, Makefile, mg.data
- Go though the code `MG.f90` to see the algorithmization of two-grid method
- Using the code `MG.f90`, reproduce the smoothing property of Jacobi solver. What does happen if we put $\boldsymbol{u}_h^0 = 0$ (initial approximation)?
- Using the code `MG.f90`, compare MG method with the direct solver and the iterative solver on the coarse grid level.
- Using the code `MG.f90`, try the restriction operator given by

$$d_{2h,i} := d_{h,2i}, \qquad i = 1, 2, \ldots, (N-1)/2.$$

- Modify the code and test it for the Jacobi method without the damping.
- Modify the code and test it for the Gauss-Seidel method.

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output files

- `fort.100`, `fort.101`, `fort.102`, ... – damped Jacobi only
- `fort.200`, `fort.201`, `fort.202`, ... – multigrid method

visuzalization in gnuplot

- `p 'fort.101' u 1:2 w l` – solution
- `p 'fort.101' u 1:5 w l` – error $u_h^k - u_h$
- `p 'fort.101' u 1:4 w l` – error $u_h^k - u(x_k)$