

Adgfem (Adaptive discontinuous Galerkin finite element method) code

- The web page, link Adgfem:
[link http://msefce.karlin.mff.cuni.cz/~dolejsi/adgfem/index.html](http://msefce.karlin.mff.cuni.cz/~dolejsi/adgfem/index.html)
- read README file
- download the package `adgfem.tgz`
- follow the instructions to install the code
- run some example
- visualize the solution

LIBRARY contains several directories

- `SRC_0` : source files
- `Grids` : computational grids
- `Subgrids` : used in goal-oriented error estimates
- others ... contains example of `file.ini` with testing data

INSTALATION

Using gfortran, otherwise modify Makefile

```
> tar xzf adgfem.tgz
> cd adgfem
> ./install.sh
```

RUNNING of the code

```
> Adgfem <file.ini>
```

<file.ini> contains data for the setting of the problem, used mesh, type of numerical methods, polynomial approximation degrees, nonlinear and linear algebraic solvers, stopping criteria, error estimation technique, mesh adaptivity, etc.

Many files arise as outputs:

- Sol*.vtk and Tri*.vtk can be used for Paraview visualization software,
- sol* and tri* can be used for adgfem visualization tools, e.g.,

```
> ../SRC_0/plotdgm tri-00000 sol-00000
```

create the sequence of files gnu.00, gnu.01, gnu.02, etc. the specification is given in input date file plot.dgm

EXAMPLE

directory Eulerian contains several <file.ini>, e.g., file nacaM0.50.ini contains data for the compressible Navier-Stokes equations, flow around NACA0012 profile with inlet Mach number=0.5, angle of attack 2 degrees and Reynolds number 5000. Running of this example:

```
> cd euleriann
> ../SRC_0/Adgfem nacaM0.05.ini
```

visualization of the results after the end of the computation

```
> ../SRC_0/plotdgm tri-00000 sol-00000
```

```
> gnuplot
```

```
gnuplot> plot 'gnu.03' w l          # plot the isolines of the Mach number
gnuplot> plot 'gnu.03' w l,'gnu.00' w l # plot the isolines of the Mach number with the mesh
```

Cases presented in the archive:

- directory **Eulerian/** – model compressible Navier-Stokes equations (NSe) and/or Eulerian model
 - `shock.ini` – NSe, 1D shock
 - `blast_wave.ini` – Eulerian, 1D expansion
 - `nacaM0.10.ini` – NSe, NACA 0012 profile, inlet Mach number 0.1
 - `nacaM0.50.ini` – NSe, NACA 0012 profile, inlet Mach number 0.5
 - `nacaM2.00.ini` – NSe, NACA 0012 profile, inlet Mach number 2.0
 - `nacaM0.85.ini` – Eulerian, NACA 0012 profile, inlet Mach number 0.85
 - `nacaM0.50_adaptH.ini` – Eulerian, NACA 0012 profile, inlet Mach number 0.5, mesh adaptation
 - `shock-vortex.ini` – Eulerian, viscous shock-vortex interaction
- directory **GO_nonlin/** – scalar problems, goal-oriented error estimates and mesh adaptation
 - `AMAcrossBiCG.ini` – Laplace equation on a cross domain, target quantity, mean value over subdomain
 - `quasiHH_JB.ini` – quasilinear elliptic equation, target quantity flux through the boundary
- directory **porous/** – porous media flow, Richards equation
 - `valcovazk.ini` – single ring infiltration experiment
 - `PM_comput.sh` – script for the generation of `*.ini` file
 - `PM_computALL.sh` – calling of `PM_comput.sh` with arguments
 - `PM_computOUT.sh` – script for visualization
 - `uloha.sh` – possible use for the cluster