SOFE - a new simple and sophisticated object oriented hp-FEM software in MATLAB

Lars Ludwig[1]

The majority of object oriented finite element software suffers from a high degree of complexity. Especially the large quantity of classes involved makes it hard to understand the role of individual components and their precise interplay among each other. However, without clearness and transparency for the applying researcher it becomes extremely difficult to implement new ideas, changes and amendments to the code that effect core concepts of the finite element method, such as setting up (hybrid)-discontinuous FE-spaces, realization of new interpolants, definition of a priori hp-meshes, computation of orders of convergence by means of reference solutions and many more.

We present a new, clearly structured and intuitive implementation of the hp-FEM in MATLAB that despite of its simplicity is able to tackle all kinds of problems and variations of the FEM in one, two and three space dimensions. After explaining the structure and flexibility of the code we demonstrate its features in various examples.

[1] TU Dresden, Institut für Numerische Mathematik, Dresden,
lars.ludwig@tu-dresden.de