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Review of the supervisor of the PhD thesis of Filip Roskovec

The PhD thesis of Filip Roskovec “Goal-oriented a posteriori error estimates and adaptivity for the numerical solution of partial differential equation” deals with the numerical solution of partial differential equations by discontinuous Galerkin method with focus on goal-oriented a posteriori error estimates which play important role in practical computations of engineering problems. Up to now, this subject has not been studied and developed at our research group.

Thesis consists of four chapters. The first one summarize mostly the known facts in goal-oriented error estimates appearing earlier in the literature. The second chapter deals with the aspects of algebraic errors arising in practical computation. These errors are usually neglected in literature (with exception of, e.g., Rannacher) but they can play an important role. The third chapter deals with goal-oriented error estimates taking into account the anisotropy of mesh element. These results were known only for piecewise linear approximation, the presented extension to arbitrary high polynomial approximation degree is completely new. The last chapter extend the techniques to the Euler equations describing a motion of inviscid compressible flows.

During my career, I have had 5 students defending their PhD thesis and Filip Roskovec is uniquely the best one. He is very excellent in theoretical numerical analysis and also in programming within our software packages for the numerical solutions of PDEs by discontinuous Galerkin methods. He is co-author of 7 journal publications (+ 4 papers in conference proceedings). He has presented the achieved results at several home and international conferences.

I can conclude that the PhD thesis of Filip Roskovec is excellent and I can recommend to award him the title PhD.

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