New Approach to Automatic Adapticity Based on Fast Trial Refinements

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We propose a new approach to automatic adaptivity for PDE problems that is based on the solution of small global problems (fast trial refinements). The effect of the fast trial refinements are monitored, either in the global norm or in terms of an arbitrary quantity of interest, and elements causing largest changes are refined. This approach is fully computational, PDE-independent, easy to parallelize, it makes it possible to perform goal-oriented adaptivity very naturally without solving the dual problem (at least for elliptic problems), and we believe that it may be capable of identifying non-local error sources in more complicated equations. The idea of the new approach will be explained and pilot one-dimensional examples will be shown.