A partition-of-unity-based (PUM) variational localization of the dual-weighted residual (DWR) estimator

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In this talk, we introduce a novel localization technique for the dual-weighted residual (DWR) method for a posteriori error estimation and mesh adaptivity. This new technique is based on the introduction of a partition of unity and uses the variational form; and is consequently very easy to apply, as neither strong residuals nor jumps over element edges are required. Such an approach is a great advantage for coupled multiphysics problems because the strong from is neither available or too expensive to evaluate. In the mathematical analysis, we show for different localization techniques (established methods and the new one), that the local error indicators used for mesh adaptivity converge with the proper order in the error functional. As key applications, we have in mind to treat nonlinear solid mechanics and multiphysics problems such as fluid-structure interaction. Related numerical examples and standard tests are consulted to illustrate our findings.

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