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Adaptive Finite Element Methods for $H(\text{curl})$ and $H(\text{div})$ Problems.

We design adaptive finite element methods (AFEMs) for variational problems posed in the Hilbert spaces $H(\text{div})$ and $H(\text{curl})$ in two and three dimensions. The main difficulty is the large null space of curl or div operators and we solve it by using discrete regular decompositions and a novel stable and local projection operator. As a result, we obtain convergence and optimal complexity of our adaptive algorithms. (Received March 08, 2011)