Sergey Korotov: *Global a posteriori error estimates for convection-reaction-diffusion problems* ; Helsinki University of Technology, Institute of Mathematics, Research Reports A515 (2007).

Abstract: *In this note we propose a nonstandard technique for constructing global a posteriori error estimates for the stationary convection-reaction-diffusion equation. In order to estimate the approximation error in appropriate weighted energy norms, which measures the overall quality of the approximations, the underlying bilinear form is decomposed into several terms which can be directly computed or easily estimated from above using elementary tools of functional analysis. Several auxiliary parameters are introduced to construct such a splitting and tune the resulting upper error bound. It is demonstrated how these parameters can be chosen in some natural and convenient for computations way so that the weighted energy norm of the error is almost recovered, which shows that the estimates proposed are, in fact, quasi-sharp. The presented methodology is completely independent of numerical techniques used to compute approximate solutions. In particular, it is applicable to approximations which fail to satisfy the Galerkin orthogonality, e.g., due to an inconsistent stabilization, flux limiting, low-order quadrature rules, round-off and iteration errors etc. Moreover, the only constant that appears in the proposed error estimates is of global nature and comes from the Friedrichs-Poincaré inequality.*

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