On the stability of finite element discretizations of convection-diffusion-reaction equations

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A priori error estimates for the local projection stabilization applied to convection-diffusion-reaction equations are generally based on the coercivity of the underlying bilinear form with respect to the local projection norm. We show that the bilinear form of the local projection stabilization satisfies an inf-sup condition in a stronger norm which is equivalent to that of the streamline upwind/Petrov-Galerkin method. As a consequence we get some insight in the stabilization mechanism of Galerkin discretizations of higher order.

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