Stability of an upwind Petrov-Galerkin discretization of convection diffusion equations

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We study a numerical method for convection diffusion equations, in the regime of small viscosity. We identify a norm for which we have both continuity and an inf-sup condition, which are uniform in mesh-width and viscosity, up to logarithmic terms, as long as the viscosity is smaller that the mesh-width. The analysis allows for the formation of a boundary layer.