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A second order numerical scheme for a singularly perturbed convection diffusion problem with a non-local boundary condition

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Abstract. This paper deals with the numerical solution of a singularly perturbed convection diffusion problem with a non-local boundary condition. The scheme uses the non-standard finite difference scheme to discretize the derivatives. Using some properties of the discrete operator the stability of the scheme is studied and a first order accuracy is established from the convergence analysis. Richardson extrapolation is then applied on the scheme to increase the first order accuracy to a second order. Numerical experiments are conducted to demonstrate the applicability of the scheme before and after extrapolation.

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