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**Convergence of a Sixth Order Compact Difference Scheme
for the Convection Diffusion Equation Using Multiscale
Multigrid Method**

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We examine an explicit sixth order compact finite difference scheme for numerical solutions of the two dimensional convection diffusion equation with variable coefficients similar to the one presented by Wang and Zhang [18]. The sixth order scheme uses a multiscale multigrid method to compute fourth order solutions on two scale grids, then applies the Richardson extrapolation and an operator based interpolation scheme to approximate the sixth order solution on the fine grid. Convergence analysis is provided in this paper to prove that the sixth order method will achieve the sixth order solutions for certain values of the Reynolds number.