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## High Order Compact Scheme with Multigrid Local Mesh Refinement Procedure for Convection Diffusion Problems

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We derive a new fourth order compact finite difference scheme which allows different meshsize in different coordinate directions for the two dimensional convection diffusion equation. A multilevel local mesh refinement strategy is used to deal with the local singularity problem. A corresponding multilevel multigrid method is designed to solve the resulting sparse linear system. Numerical experiments are conducted to show that the local mesh refinement strategy works well with the high order compact discretization scheme to recover high order accuracy for the computed solution. Our solution method is also shown to be effective and robust