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Numerical Simulations of Flows in Dimpled Channels

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Laminar and turbulent channel flows over dimples are studied using our parallel multiblock multigrid incompressible flow solver. “Horse-shoe” vortex has been found in laminar regime. Due to the separation structures inside dimples large reduction of shear drag can be achieved. However, net reduction of total drag in laminar regime is rather minor because the inevitable increases of form drag. DNS of turbulent flow over dimpled channel has also been carried out. Flow visualization shows turbulent flow structures are more complex on dimpled channel than those on a flat wall channel. These results may help to explain the heat transfer augmentation effects of dimpled surfaces.

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