Fourth Order Compact Formulation of Navier-Stokes Equations and Driven Cavity Flow at High Reynolds Numbers ERCAN ERTURK, CIHAN GOKCOL, BAHTIYAR DURSUN, HAKAN KAYKISIZLI, Gebze Institute of Technology — A new fourth order compact formulation for the steady 2-D incompressible Navier-Stokes equations is presented. The uniqueness of this formulation is that the final form of the fourth order compact formulation is in the same form of the Navier-Stokes equations such that any numerical method that solve the Navier-Stokes equations can be easily applied to this fourth order compact formulation. Moreover, with this formulation, any existing code that solve the Navier-Stokes equations with second order accuracy ($O(\Delta x^2)$) can easily be altered to provide fourth order accurate ($O(\Delta x^4)$) solutions just by adding some coefficients into the code at the expense of extra CPU work of evaluating these coefficients. The efficiency of this formulation will be demonstrated.

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Date submitted: 13 Sep 2005

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