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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 ($\mathcal{O}\Delta x^2$) can easily be altered to provide fourth order accurate ($\mathcal{O}\Delta x^4$) 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.

Ercan Erturk
Gebze Institute of Technology

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