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Drag Reduction of an Airfoil Using Deep Learning CHIYU JIANG, ANZHU SUN, PHILIP MARCUS, Univ of California - Berkeley — We reduced the drag of a 2D airfoil by starting with a NACA-0012 airfoil and used deep learning methods. We created a database which consists of simulations of 2D external flow over randomly generated shapes. We then developed a machine learning framework for external flow field inference given input shapes. Past work which utilized machine learning in Computational Fluid Dynamics focused on estimations of specific flow parameters, but this work is novel in the inference of entire flow fields. We further showed that learned flow patterns are transferable to cases that share certain similarities. This study illustrates the prospects of deeper integration of data-based modeling into current CFD simulation frameworks for faster flow inference and more accurate flow modeling.

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