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Deep learning of unsteady laminar flow over a cylinder[1] SANGSE-
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Unsteady flow over a circular cylinder is reconstructed using deep learning with
a particular emphasis on elucidating the potential of learning the solution of the
Navier-Stokes equations. A deep neural network (DNN) is employed for deep learn-
ing, while numerical simulations are conducted to produce training database. Instan-
taneous and mean flow fields which are reconstructed by deep learning are compared
with the simulation results. Fourier transform of flow variables has been conducted
to validate the ability of DNN to capture both amplitudes and frequencies of flow
motions. Basis decomposition of learned flow is performed to understand the under-
lying mechanisms of learning flow through DNN. The present study suggests that
a deep learning technique can be utilized for reconstruction and, potentially, for
prediction of fluid flow instead of solving the Navier-Stokes equations.

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