

Abstract Submitted
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Comparison of Deep Learning strategies for flow field reconstruction from wall measurements SAMIR BENEDDINE, ONERA, 8 rue des Vertugadins, FR-92190 Meudon, FRANCE — This work explores deep learning reconstruction techniques to estimate the pressure field in the laminar wake of a bluff body from a few wall measurements. It aims at comparing two main strategies: a classical approach, where a neural network maps the input (the point-wise pressure measurements) to the target (the full pressure field) by minimizing the L_2 -norm of the error between the output of the network and ground truth, a so-called decoupled approach, based on Generative Adversarial Networks. For the latter, a network is first trained to generate fields that are not distinguishable from actual pressure field obtained from a simulation. Then, given input measurements, it searches for the best match among all the possible field that it can generate. This generative strategy is a state-of-the-art approach for image inpainting, and it presents several strong advantages over the first method. For instance, it is totally flexible with respect to the input measurements: the same network can carry out the reconstruction no matter the location or the number of input sensors. Other interesting advantages will be detailed during the presentation, such as the ability of generative approaches to be used for temporal super-resolution.

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