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Bringing Computational Fluid Dynamics at the heart of industrial processes: can Machine Learning help? CHRISTOS VARSAKELIS, SANDRINE DESSOY, GlaxoSmithKline Biologicals — Advances in both physical understanding and computational power have rendered several industrial problems amenable to a Computational Fluid Dynamics (CFD) analysis. However, even though in silico prototyping is gradually becoming the norm, utilizing the predictive power of CFD for real-time tasks, e.g. controlling a process, remains prohibitive. Recent literature has suggested that Machine Learning (ML) algorithms may be trained by CFD simulations and, subsequently, replace CFD codes due to their speed advantage. In this talk, we systematically evaluate this proposal through a series of industrial test cases of varying complexity. Both laminar and turbulent test cases are examined for various spatio-temporal scales. The talk concludes with the ranking of the performance of ML algorithms in terms of accuracy, size of training data required, speed of execution and computational cost.

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