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Data- driven design and predict heat exchanger performance: configuration complexity and difficulty of prediction ZHIFENG ZHANG, Process Engineering and Combustion, Delaware Innovation Campus, American Air Liquide, Newark, DE 19702, YILUN CHEN, Computational and Data Science, Delaware Innovation Campus, American Air Liquide, Newark, DE 19702, JIEFU MA, Process Engineering and Combustion, Delaware Innovation Campus, American Air Liquide, Newark, DE 19702, COMPUTATIONAL AND DATA SCIENCE COLLABORATION, PROCESS ENGINEERING AND COMBUSTION COLLABORATION — Data-driven methods have shown potential capabilities in accelerating future designs, optimizations, and evaluations. However, due to the complexity of fluid flow and geometry configurations of industrial devices, it is challenging to train effective data-based models. In the present research, we explore the relationship between device configuration complexities and reliable prediction algorithms. Taking a 2D plate heat exchanger as an example, we first use computational fluid dynamics solver to generate fluid flow/heat transfer data and then we train machine learning models to predict device performance. By increasing the complexity of the geometry configurations, we repeat the process and study the relationship between geometry configurations and machine learning models. Through the study, we can conclude the suitable algorithm for the specific plate heat exchanger application.

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