# Development of Computational Fluid Dynamics based Reactor Surrogate Model via Physics Informed Neural Network

최솔지, 나종걸[1], 이종민†
서울대학교; [1]이화여대
(jongmin@snu.ac.kr†)

Computational Fluid Dynamics(CFD) is a powerful tool for simulating fluid mechanics and used to solve the engineering problems that involve fluid flow. CFD is applied to a wide range of researches such as aerodynamics, environmental engineering and industrial system modeling. However, CFD simulation has a crucial problem of long computational time. Due to its disadvantage, it has been limited in using for real time system analysis. In order to resolve those problems, lots of studies on CFD based surrogate model have been performed.

In this presentation, we introduce the Physics Informed Neural Network(PINN) which is firstly proposed by Raissi et al (2019). PINN is very useful for applying to the systems where the first principles are given in the form of partial differential equation(PDE). PINN can deduce with high accuracy even with a small data set. Model shows high performance in a space where the data does not exist because it can be trained at any space to satisfy the governing equation without actual data. In this talk, we show the feasibility of PINN on chemical process system such as reactor and suggest the applicability of model to process design, optimization and control.