

Study of Uniformity in the Reformer Mixing Zone using 2-dimensional Flow Analysis

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In catalytic reforming of hydrocarbon, monolithic catalyst has remarkable advantage of low pressure drop and mechanical durability, compared to pellet type catalyst. In modeling of monolithic catalyst, one should think about its modeling complexity because of its structure. Non-uniformity of properties in the inlet of catalyst could lead to complex modeling approach because the results of each channel will be different due to different inlet condition. If we make sure that inlet properties of the catalyst is uniform, the catalyst modeling could be conducted in a simpler way using additional assumptions. In this study, 2-dimensional simulation, using computational fluid dynamics software ANSYS FLUENT, is conducted to see the behavior of mixing zone. We measure the effect of non-uniformity by analyzing the flow of mixture consists of dodecane, air, and steam will flow through cylinder shaped mixing zone, which is 2-dimensional axisymmetric. By changing inlet property profile, we could see how the inlet profile change affects the outlet profile and the inlet profile of monolithic catalyst.