Analysis of the structural benefits of SCC (spinning cone column) using CFD

김신혁, 배성웅, 이재형†
KAIST

SCC has a variety of complex structural benefits. The mechanical impact (rotatory force) compels the complicated fluid dynamics of liquid phase, and the arrangement of cones disturbs the inner gas flow. These geometric resistances increase the interfacial area of gas-liquid flow and improve the mass transfer effect between gas and liquid.

In this study, the various effects of the structural features have been explored using three-phase computational fluid dynamics (CFD) model. The three-phase consisted of a liquid spray, a liquid film, and a gas had to be considered in CFD modeling, because the liquid phases should be divided into a liquid film and discrete liquid particles. The obvious sortation of the phases enabled the calculation of the slip velocity between the phases. Also, the calculated values allowed to predict the mass transfer rate between the interfaces. On the basis of these approach, with the increase in fluid flow rate or rotatory speed, the mass transfer rates in inner spray and liquid film were predicted to be risen. Eventually, optimal operating condition and design parameter should be searched, since these values influence the mass transfer between interfaces.