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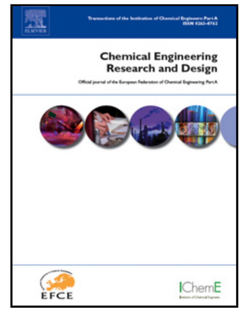

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Numerical research on vapor splitter in divided wall column

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Highlights

- A new splitter is proposed, which can regulate the vapor split ratio.
- The allocation rule of the vapor splitter is obtained.
- The vapor uniformity is increased by optimizing the position of the splitter.

Abstract:

In order to lower the difficulty to control the vapor split ratio of divided wall column (DWC) and to optimize auto-allocated vapor flow rate on the both side of the divided wall in real industry, this paper presents a new vapor ratio regulator. The splitter, which is based on the Coanda effect, is installed in the bottom section of the DWC to control vapor flow rate on both sides of the DWC and solve the problem of vapor allocation in the DWC. In this research, Auto-cad, computational, Tecplot, and Origin are used to do data analysis. By tracking the vapor flow trajectory and analyzing the splitter's allocation rule, it is shown that the R_V can be effectively regulated by adjusting the velocity of the gas inlet. In order to achieve a high uniformity of the vapor flow field of regulator, the installation location of the device is optimized.

Keywords: DWC; Vapor splitter; Computer modeling; Gas distribution;

Nomenclature

A = the light component;
A_i = the area of the *i*-th sieve hole, m^2;
B = the middle component;
C = the heavy component;
C_0 = the orifice coefficient ($0.62<C_0<0.95$);
C_1,C_2,C_3 = constant;
F = Kinetic energy factor of air, $m/s(kg/m^3)^{0.5}$;
Fe = the location of the feed tray;
G_b = a turbulent kinetic energy generated because of buoyant force;
G_k = the turbulent kinetic energy generated due to the laminar velocity gradient;