Optimization of turbulent flow in a radial reactor with fixed bed

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Abstract: The data of the computation of turbulent flow in the CF-π and CP-π configurations of the radial reactor with a fixed bed are presented.

Turbulent flow in the annular duct and in the central pipe is described by the Reynolds equations [1]. The macroscopic k-ϵ turbulence model [2,3] in the variables averaged over the local volume of the catalyst bed and is used for determining eddy viscosity in a porous media.

The macroscopic variables determined over a local volume of the porous medium are used in a fixed bed for flow description [4]. The motion equations with the Ergan drag law in macroscopic variables are used for flow description in the catalyst bed.

The computational data are obtained for the averaged and turbulent characteristics, and it is shown that the flow in the fixed bed causes the generation of the turbulence kinetic energy and its dissipation rate; the flow in the CF-π configuration is distributed more uniformly as compared to the CP-π configuration of the radial reactor. Computed data are compared with the experimental ones.

Keywords: radial reactor, fixed bed, k-ϵ turbulence model.

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