**144e CFD Simulations of Flow in Fixed Beds of Cylindrical Particles**

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Fixed bed catalytic reactors are used throughout the chemical industry. Multitubular reactors with low tube-to-particle diameter ratios (N) are especially used for reactions with strong heat effects, such as partial oxidations and steam reforming. The design and optimization of the catalyst particle for activity, pressure drop and heat transfer is particularly important for steam reforming and requires an understanding of how the flow patterns and temperature field near the tube wall are affected by changes in particle geometry. This information can be provided by CFD simulations of flow in fixed bed packings. Our previous uses of CFD in fixed bed simulations have been for packings of full beds of spheres, bed segments of spheres and bed segments of cylinders. We have verified that 120-degree segments of tubes packed with spheres can represent very well the flow profiles of full tubes packed with spheres. The corresponding verification for packings of cylinders has not yet been performed as models of full tubes packed with cylinders at industrial flow rates have required grids that are too large for the available computers to handle. In the present work we present the first CFD simulations of flow in a full tube cross-section packed with cylinders. These were obtained with 64-bit multi-processor workstations, under conditions that allowed less fine grids to be used. The cross-section is thin and periodic in the axial direction. The results illustrate convergence problems with models of such complex geometry, and we shall put forward some ideas on suitable measures of convergence in fixed bed simulations. Results of mesh refinement studies will be presented, as well as a comparison of different void fractions in the bed. Comparisons will be shown between flow in the full bed of cylinders and flow in a 120-degree segment such as used in our previous work. The predicted pressure drops from the two models will also be compared with each other and with literature correlations.