# Institute of Chemical Engineering



# Flow phenomena in laminar flow through streamlined and sharp-edged short monolithic structures


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Monolithic structures of catalytic reactors offer low flow resistance, but their drawback is weak heat and mass transport. For transport intensification, innovative streamlined structures were designed, the walls of which are shaped like an airplane wing. Extensive CFD (Computer Fluid Dynamics) studies were performed for the streamlined and—for comparison—classic (sharp-edged) structures, covered flow phenomena, and heat transfer to channel walls. The streamlined structures were made using the SLM (Selective Laser Melting) method to perform heat transfer experiments that gave a satisfactory agreement with the CFD. Heat transfer for streamlined structures was, by CFD, more intensive than for the classical ones. CFD simulations showed a significant reduction of vortices in streamlined structures. The lack of an inlet vortex was demonstrated, for classic structures strongly limiting transfer properties. For the streamlined structures the outlet vortex even intensifies heat transport near the outlet of the channel. The CFD showed the flow patterns for the structures as well as the distribution of transport coefficients within the millimetre-sized channels.

# Metryczka


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