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Micromixers are key components in several micro electro-mechanical and lab-on-a-chip systems, which are increasingly applied in fields such as chemistry, chemical synthesis, biotechnology and environment control.

A CFD-based study is presented, which includes design modeling, flow and mass transfer simulation and geometric parametric analysis of a passive micromixer that presents curved shape obstacles and grooves in the mixing channel as main geometric features. The parametric study helps to identify the effect of some geometric dimensions on mixing quality, pressure loss and shear stress levels. The aim of the study is to reduce the pressure drop while keeping the mixing level in the channel with the inclusion of grooves which create additional secondary flows in a chaotic pattern and reduce the effect of the nozzle formed at the tip of the obstacles.

To our knowledge, this specific combination of obstacles and grooves in micromixer geometries has not been previously investigated.

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