

Development and Comparative Analysis of a New C-H Split and Recombine Micromixer

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Abstract : In the present study, a new passive micromixer based on SAR principle, combining the operation concepts of known Chain and H mixers, called C-H micromixer, is developed and studied. The efficiency and the pressure drop of the C-H mixer along with two known SAR passive mixers named Chain and Tear-drop were investigated numerically at Reynolds numbers up to 100, taking into account species transport. At the same time experimental tests of the Chain and Tear-drop mixers were carried out at low Reynolds number, in the $0.1 \leq Re \leq 4.2$ range. Numerical and experimental results coincide considerably, which validate the numerical simulation approach. Results show that mixing efficiency of the Tear-drop mixer is good except at the middle range of Reynolds number but pressure drop is too high; conversely the Chain mixer has moderate pressure drop but relatively low mixing efficiency at low and middle Re numbers. Whereas, the C-H mixer gives excellent mixing efficiency at all range of Re numbers. In addition, the C-H mixer shows respectively about 3 and 2 times lower pressure drop than the Tear-drop mixer and the Chain mixer.

Keywords : CFD, micromixing, passive micromixer, SAR

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