World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:11, No:07, 2017

The Droplet Generation and Flow in the T-Shape Microchannel with the Side Wall Fluctuation

Authors : Yan Pang, Xiang Wang, Zhaomiao Liu

Abstract : Droplet microfluidics, in which nanoliter to picoliter droplets acted as individual compartments, are common to a diverse array of applications such as analytical chemistry, tissue engineering, microbiology and drug discovery. The droplet generation in a simplified two dimension T-shape microchannel with the main channel width of 50 μm and the side channel width of 25 μm, is simulated to investigate effects of the forced fluctuation of the side wall on the droplet generation and flow. The periodic fluctuations are applied on a length of the side wall in the main channel of the T-junction with the deformation shape of the double-clamped beam acted by the uniform force, which varies with the flow time and fluctuation periods, forms and positions. The fluctuations under most of the conditions expand the distribution range of the droplet size but have a little effect on the average size, while the shape of the fixed side wall changes the average droplet size chiefly. Droplet sizes show a periodic pattern along the relative time when the fluctuation is forced on the side wall near the T-junction. The droplet emerging frequency is not varied by the fluctuation of the side wall under the same flow rate and geometry conditions. When the fluctuation period is similar with the droplet emerging period, the droplet size shows a nice stability as the no fluctuation case.

Keywords : droplet generation, droplet size, flow flied, forced fluctuation
Conference Title : ICFMFA 2017 : International Conference on Fluid Mechanics and Flow Analysis
Conference Location : Paris, France
Conference Dates : July 20-21, 2017