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Chaotic Mixing in Three-Dimensional Microchannel Flow[1] THUY HONG VAN LE, YOUNG KWOEN SUH, SANGMO KANG, Dong-A University, South Korea — The quality of chaotic mixing in three-dimensional microchannel flow has been numerically studied using particle tracking techniques such as Poincare section and Lyapunov exponents. The chaotic mixing was generated by applying alternating current to electrodes embedded on the bottom wall at a first half period and on the top wall at a second half period. The equations governing the velocity and concentration distributions were solved using Fractional-step method (FSM) based on Finite Volume approach. Results showed that the mixing quality depended significantly on the modulation period. The modulation period for the best mixing performance was determined based on the mixing index for various different initial conditions of concentration distribution. The optimal values of modulation period obtained by the particle tracking techniques were compared with those from the solution of concentration distribution equation using FSM and CFX software and the comparison showed their good match.

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