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Numerical Analysis of Micromixers for Optimization of Mixing Action[1] YOGENDRA PANTA, PARAM ADHIKARI, Department of Mechanical Engineering, Youngstown State University — Micro-bio/chemical applications often require rapid and uniform mixing of a number of fluid streams that carries bio/chemical species in the solution. At microscale, fluid flow is highly laminar with low Reynolds number, fluids mixing mechanism is primarily by diffusion and free from any turbulence. Demand for highly efficient micromixers for microfluidic networks is due to slower mixing process for larger bio-molecules such as peptides, proteins, and nucleic acids compared to micro-scale molecules. Passive and active mixers are two basic mixers that are currently in use for these applications. Passive mixers often require very long mixing channels where are most active mixers require bulky moving parts to stir the fluids. In this study, electroosmotic effects orthogonally aligned with the fluid flowstream are utilized for optimum mixing effect in various micromixers. Cross-dependencies among several geometrical, electrical, and fluid parameters and their significance are studied in order to achieve an optimum mixing effect. It has been planned to optimize the mixer by non-moving stirring actions provided by an external magnetic field.

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