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Effect of frequency and electrode configuration on yeast cells subjected to traveling electric fields[1] SAI NUDURUPATI , PUSHPENDRA SINGH, Department of Mechanical Engineering, New Jersey Institute of Technology, NADINE AUBRY, Department of Mechanical Engineering, Carnegie Mellon University — Biological particles, such as bacteria and viruses are the major cause for diseases and much of the current research has been devoted in identifying, and separating them. One way to trap these micro/nano sized particles is by conventional dielectrophoresis, which occurs due to varying electric fields. A much more efficient way is to combine this with the traveling wave dielectrophoresis force and torque, in which case the fluid is not required to be pumped into the channel. The particle electrodynamics is not only explained using these forces, but also with viscous drag associated with the fluid, and the electrostatic and hydrodynamic particle-particle interactions. The numerical scheme used for solving the equations of motion for the fluid and particles is based on Distributed Lagrange Multiplier (DLM) method. It is found that the motion of the yeast cells is determined primarily on the frequency dependent Clausius-Mossotti factor which is complex. Motion is also influenced by the specific configuration used, and hence two different MEMS devices, with electrodes at the bottom, are investigated.

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