The effect of magnetisation and Lorentz forces in a two-dimensional biomagnetic channel flow

Abstract

The present paper studies the fundamental problem of a Magnetohydrodynamics (MHD) behaviour of the biomagnetic fluid flow in a channel under the influence of a spatially varying magnetic field. The governing equation involves the presence of magnetization and Lorentz forces for the magnetic field description. Solution of the problem is obtained using an improved finite difference method that employs staggered grid in its discretisation. This approach has successfully handled the pressure of the flow which is the main problem in the standard finite difference method. Results concerning the velocity and skin friction indicate that the presence of magnetic field appreciably influence the flow field. In particular, a distortion in terms of asymmetric flow profile is observed near the magnetic source. Also, vortices have been observed near the lower plate where the magnetic source is placed.

Keywords