ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

ΤΜΗΜΑ ΜΑΘΗΜΑΤΙΚΩΝ

Εβδομαδιαίο Σεμινάριο

Some Physical Problems Of Biomagnetic Fluid Dynamics

Ευστράτιος Τζιρτζιλάκης

Τμήμα Μηχανολογίας και Υδάτινων Πόρων, ΤΕΙ Μεσολογγίου

Biomagnetic Fluid Dynamics (BFD) is a relatively new area in fluid mechanics investigating the fluid dynamics of biological fluids in the presence of magnetic field. A biomagnetic fluid is a fluid that exists in a living creature and its flow is influenced by the presence of a magnetic field. The most characteristic biomagnetic fluid is blood. In the current presentation, a mathematical model for blood flow in magnetic field will be demonstrated. This mathematical model is consistent with the principles of Ferrohydrodynamics (FHD) and Magnetohydrodynamics (MHD). The biomagnetic fluid is considered as a homogeneous, non-isothermal, Newtonian fluid and is treated as an electrically conducting magnetic fluid which also exhibits magnetization. The governing equations of the physical BFD problems form a coupled, non linear system of Partial Differential Equations (PDEs) with appropriate boundary conditions. The resulting system of PDEs, after the introduction of appropriate non-dimensional variables, is solved numerically using various methods common at computational fluid mechanics. As an application, some basic flows of BFD physical problems will be presented and numerical results will be given. These results indicate that the application of a magnetic field influences significantly the flow field and the BFD problems should be further studied for possible useful medical and engineering applications.

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