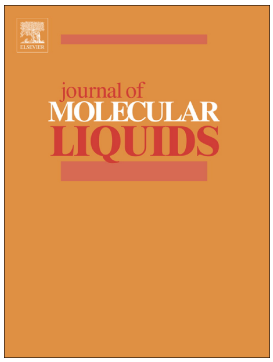

Investigating the effect of external uniform magnetic field and temperature gradient on the uniformity of nanoparticles in drug delivery applications

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Investigating the Effect of External Uniform Magnetic Field and Temperature Gradient on the Uniformity of Nanoparticles in Drug Delivery Applications

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Abstract

Studying the behavior of nanoparticles in fluid flows is one of the most interesting problems in recent years. Uniformity and distribution of nanoparticles are very important parameters in industrial and medical applications. In this study, steady and incompressible blood flow in a 3D simple vessel with two inlets in the presence of uniform external magnetic field is numerically studied using the finite volume method in the open source code, OpenFOAM. The fluid governing equations are modeled in the Eulerian framework and the particles equations are solved using the Lagrangian method. The results showed that higher uniformity in nanoparticles distribution, which is critical for drug delivery purposes, may be achieved at lower Reynolds number and higher Hartman number and temperatures. The concurrent injection angle will boost the uniformity and the lowest value considered lead to the highest uniformity. The effect of magnetic field is slightly more highlighted than the temperature gradient and maintains its incremental behavior by increasing the Hartman number while temperature effect diminishes by increasing the temperatures.

Keywords: Temperature gradient; MHD; Drug nanoparticles; Uniformity factor.

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