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Similarity solutions and conservation laws for rotating flows of an Oldroyd-B fluid

Abstract

In this paper, similarity reduction arising from classical Lie point symmetries of unsteady hydromagneticflows of a rotating Oldroyd-B fluid under influence of Hall currents is carried out. By employing different combinations of translation and rotational symmetries, a class of new exact solutions under certain initial and boundary conditions has been obtained. A detailed comparative study of these solutions for different cases in perspective of previous literature is also presented. Solutions in existing literature have turned out to be special cases of similarity solutions obtained here. Finally, some nontrivial conservation laws of underlying system of the model are computed.

Keywords

Conservation laws; Oldroyd-B fluid; Similarity solutions; Symmetry reduction