

Liao, Shi-Jun**On the analytic solution of magnetohydrodynamic flows of non-Newtonian fluids over a stretching sheet.** (English) Zbl 1063.76671*J. Fluid Mech.* 488, 189-212 (2003).

Summary: A powerful, easy-to-use analytic technique for nonlinear problems, the homotopy analysis method, is employed to give analytic solutions of magnetohydrodynamic viscous flows of non-Newtonian fluids over a stretching sheet. For the so-called second-order and third-order power-law fluids, the explicit analytic solutions are given by recursive formulas with constant coefficients. Also, for real power-law index and magnetic field parameter in a quite large range, an analytic approach is proposed. All of our analytic results agree well with numerical ones. In particular, a simple analytic formula of the dimensionless velocity gradient at the wall is found, which is accurate for all real power-law indices and magnetic field parameters. This analytic formula can give sufficiently accurate results for the skin friction on the moving sheet that it would find wide application in industries. Physically, they indicate that the magnetic field tends to increase the skin friction, and that this effect is more pronounced for shear-thinning than for shear-thickening fluids.

MSC:[76W05](#) Magnetohydrodynamics and electrohydrodynamics[76A05](#) Non-Newtonian fluids[76M25](#) Other numerical methods (fluid mechanics) (MSC2010)Cited in **165** Documents**Full Text:** [DOI](#)