



Nonlinear waves in compressible shallow water magnetohydrodynamic equations

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Compressible magnetohydrodynamic equations for a plasma in a gravity field with a free surface in shallow water approximation are obtained. Compressibility means that the pressure is a function of height. It is shown that classical shallow water incompressible magnetohydrodynamic equations are modified with a new argument instead of a layer height. We found all the simple discontinuous and continuous wave solutions for these equations, the wave velocities are obtained. Rankine-Hugoniot jump conditions for the velocities and magnetic field in the discontinuity are obtained. The Riemann problem for the arbitrary discontinuity is solved. It was found that the decay of arbitrary discontinuity causes five different configurations. For each configuration, we found the conditions necessary and sufficient for its implementation.