New Exact MHD Solutions Describing the Stagnating Z-pinch plasma[1] A.L. VELIKOVICH, J.L. GIULIANI, J.W. THORNHILL, Plasma Physics Division, NRL, S.T. ZALESAK, Berkeley Research Associates, Y. MARON, A. STAROBINETS, Weizmann Institute of Science, E.P. YU, Sandia National Laboratories — Recent 3D RMHD simulations at Sandia and experiments at Weizmann Institute of Science have demonstrated that axially and azimuthally averaged dynamics of a strongly radiating stagnated Z-pinch column resembles a self-similar, cylindrically symmetric motion. The cold, rapidly imploding plasma transforms into the hot stagnated plasma heated and compressed in the diverging shock wave that propagates from the pinch axis. The simplest analytical solution describing such flow was given by Noh. Here we discuss generalizations of the classical Noh's solution, which take into account the non-uniform density and velocity profiles in the incident plasma, as well as the presence of azimuthal magnetic field in it. These new solutions are found to be surprisingly close to the observations and simulation results. They have also been used for verification tests of MHD codes.

Alexander Velikovich
Plasma Physics Division, Naval Research Laboratory

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