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Investigation of the role of ion stopping power in Z-pinch stagnation physics[1] THOMAS MEHLHORN, JOHN GIULIANI, WARD THORNHILL, Naval Research Laboratory, YITZHAK MARON, Weizmann Institute — A recently published paper examining the pressure and energy balance of stagnating plasmas in K-shell radiating z-pinch experiments shows that the stagnating plasma pressure is balanced by the implosion pressure and the radiation energy is provided by the imploding-plasma kinetic energy. This result is shown to be valid for both neon gas-puff loads on the 500 kA, 500 ns Weizmann pulsed power generator and for nested aluminum-titanium wire array experiments on Sandia's Z- machine at 20 MA, 100 ns. Multi-frame pinhole photography and spectroscopic analysis of the neon gas puff has shown that the radius of the stagnation plasma increases from 0.2 mm to 0.45 mm over a 3.5 ns time period and that the density is nearly constant during the K-shell emission period. A very similar phenomenology of constant density and growing radius is observed on Sandia's Z machine for imploding wire array experiments with radius growing from 0.6 to 2.1 mm over a 6 ns period. In this poster we will study what role the kinetic energy loss of the imploding ions in the stagnation plasma may play in determining the initial scale, density, and evolution of the stagnation plasmas in these two K-shell emission systems.

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