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Analytic approximations for an axisymmetric strong shock wave[1]

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— The modelling of shock waves has many applications, including to electrostatic discharge phenomena. We recall the similarity solution for a radially expanding strong shock, consisting of normalized pressure, velocity, and mass density. The numerical solution of coupled ordinary differential equations with appropriate boundary conditions yields these quantities as a function of the scaled radial position of the shock front. Based upon such numerical results, we then present approximate analytic relations between the various normalized quantities. Various derived quantities follow from such a model, including the total energy per unit length delivered by the shock.

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