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The Radially Symmetric Euler Equations as an Exterior Differential System ROY BATY, SCOTT RAMSEY, JOSEPH SCHMIDT, Los Alamos National Laboratory — This work develops the Euler equations as an exterior differential system in radially symmetric coordinates. The Euler equations are studied for unsteady, compressible, inviscid fluids in one-dimensional, converging flow fields with a general equation of state. The basic geometrical constructions (for example, the differential forms, tangent planes, jet space, and differential ideal) used to define and analyze differential equations as systems of exterior forms are reviewed and discussed for converging flows. Application of the Frobenius theorem to the question of the existence of solutions to radially symmetric converging flows is also reviewed and discussed. The exterior differential system is further applied to derive and analyze the general family of characteristic vector fields associated with the one-dimensional inviscid flow equations.

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