

# *A Note on “The Method of Characteristics for a Perfect Compressible Fluid in General Relativity and Non-Steady Newtonian Mechanics”*\*

N. COBURN

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**1. Introduction.** In our previous paper [1], we used the terms (1) “order of a quantity” and (2) “order of a quantity as compared to another quantity”. Further, we obtained the characteristic system for a compressible fluid in non-steady Newtonian mechanics from the characteristic system of a compressible fluid in relativity theory under the assumption that  $a/c$  is of order zero, where  $a$  is the local sound speed and  $c$  is the speed of light [1]. In this paper, we shall formulate precise definitions of the terms “order of a quantity” and “order of a quantity as compared to another quantity”. Also we shall show that the characteristic system in the non-steady Newtonian case can be obtained *without use of the assumption that  $a/c$  is of order zero*. All of the previously derived equations for the Newtonian case remain valid.

**2. Definitions and the Basic Order Assumption.** We define the term “order of the quantity  $Q$ ” by use of the *maximum range* of values through which the *absolute value of the quantity may vary*. Two types of quantities will be considered: Newtonian quantities; relativistic quantities. *If the absolute value of  $Q$  is such that*

$$(2.1) \qquad |Q| \leq 10^k$$

*then  $Q$  will be said to be of order one*. We assume that  $k$  is chosen so that  $10^k$  is the upper bound of the magnitude of the velocity in Newtonian mechanics. In the foot-second system,  $k = 5$  would appear to suffice. For quantities in relativity theory, it is desirable to compare magnitudes with powers of the

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