

MOTION OF GAS PARTICLES BASED ON THE GALILEI GROUP

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Invariants of the Galilei group determine the invariant and partially invariant solutions of continuum mechanics equations. Invariant motions have a point density collapse with straight world lines. The invariant characteristics of the equations of gas dynamics, which can be used to construct weak solutions with a discontinuity of the derivatives, are considered. Partially invariant solutions with a linear velocity field are investigated for special gas equations; such solutions are regular. There are possible solutions with a point collapse at an infinitely distant point. A classification of such solutions is given for the state equations from the group classification of the gas dynamics equations. The motion of gas particles for such solutions occurs along curvilinear trajectories to a point collapse or from a point source. The classification uses the method of separation of variables in the equation for functions of different independent variables. The same motion of gas particles is possible for different equations of state.

Keywords: gas dynamics, Galilei group, partially invariant solutions, linear field of velocities, point collapse, state equation, method of separation of variables.

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