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Jumps across an outgoing spherical shock wave front YUKIO SANO[1], TOMOKAZU SANO, Osaka University — Two types of jump equations are derived from the equations of conservation of mass and momentum in a moving coordinate system and in the inertial coordinate system. The first equations, of Rankine-Hugoniot (RH) type, show that the geometrical effect may be neglected at distances of movement of the rear of the wave front that are more than ten times as long as the effective wave front thickness. Furthermore, using conditions required to satisfy the RH jump conditions, which are shown by the RH type equations, a method is developed to judge the applicability of the RH jump conditions to the jumps. The second equations are those of general form obtained by expressing a volumetric strain wave ε in the wave front by any form. In the neighborhood of the center of the wave front, for ε <0.09, radial particle velocity in the jump in any materials is inversely proportional to the square of a dimensionless distance from the center to the rear, and for ε <0.04, radial stress in the jump in some viscous fluids and solids is inversely proportional to the distance. In conclusion, an outgoing spherical wave front attenuates greatly near the center due to the geometrical effect as well as rarefaction waves overtaking from behind, while the geometrical effect is negligible at the specified positions that are distant from the center.

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