

APPROXIMATE ANALYTIC SOLUTION OF A CYLINDRICAL IMPLODING SHOCK WAVE

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ABSTRACT

Due to increasing interest in the problem of implosion, this problem is viewed as the necessary step in realizing thermonuclear fusion. The imploding cylindrical shock wave is included by a cylindrical piston converging onto the central axis. The flow behind the imploding shock has been studied. Imploding shock propagating through homogeneous medium near the axis of implosion has been considered when the flow assumes self-similar character. An approximate analytic solution of the problem in a closed form by employing the Chernyii's expansion technique has been obtained in which the flow variable is expanded in a series of powers of ϵ the density ratio across the strong shock. An analytical expression for the similarity exponent λ from the singular point analysis of the single differential equation has also been obtained. The problem of imploding shock studied belongs to a class of self-similar motion of the second kind. An approximate analytic solution of the flow behind the cylindrical imploding shock propagating in a homogeneous medium in a closed form has been obtained when the flow is adiabatic.

KEYWORDS: Implosion, Imploding Cylindrical Shock, Self-Similar, Homo-Thermal & Similarity Exponent