THE THEORY AND EXPERIMENTAL INVESTIGATION OF REGULAR AND MACH REFLECTION OVER A DOUBLE WEDGE

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Part I: The theory and shock analysis
2 blast reflection processes which are not well understood re the reflection from a concave or a convex cylinder, and the interaction of a regular or a Mach reflection with a positive or negative change of the slope of the reflecting surface.

As an approach to the solution of these problems the reflection processes of a planar shock wave over a concave or convex double wedge, have been studied.

To simplify the analysis of the shock reflection processes a number of assumptions were made, namely: that transition between regular and Mach reflection would take place according to the theoretical detachment criterion; that all Mach stems would be straight, and that the Mach number of a Mach stem shock wave was sufficiently close to that of the incident shock that the same transition angle could be used. The analysis has been done for week and strong waves. In both cases it was found that there are 7
different reflection processes depending upon the incident shock Mach number, and the wedge geometry. The 7 different reflection processes can be mapped for a given incident shock wave Mach number.
The expected shock front configurations in each of the 7 regions will be presented, and the shock polar theory used to predict the pressure changes across each shock along the reflecting surface.

It is known that transition between regular and Mach reflection over a wedge does not occur at the angle predicted by theory; that for most shock strengths the Mach stem shock is curved. and that there will be a slight difference in the transition angle for the incident and Mach stem shock waves. Nevertheless we believe that the shock reflection processes described in this study are equilitatively correct.