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Hydro-Reactive Calculations of Detonation in Ribs. YEHUDA PARTOM, RAFAEL — We use our Surface Burn (SB) reactive flow model with Temperature Dependent Reaction Rate (TDRR) to calculate detonation in explosives in the shape of cylindrical ribs. The main purpose is to check the assumptions of the Detonation Shock Dynamics (DSD) model which are: 1) the normal detonation velocity (D_n) depends on the local curvature (k), and this dependence is unique and single valued; 2) there is a limiting angle boundary condition at the boundaries; and sometimes also 3) there is a failure curvature beyond which quasi-steady detonation cannot propagate. Usually D_n(k) is calibrated from breakout curves obtained from rate stick tests. Such tests cover only part of the curvature range, and they sometimes indicate that D_n(k) may be non unique. Running hydro-reactive calculations for ribs we found that it is possible to extend substantially the range of curvature being monitored. Performing these calculations for PBX-9502 we found the following: 1) after a short travel in the rib the front reaches steady state in terms of shape and angular velocity; 2) the D_n(k) relation obtained is not unique, but varies with rib geometry; 3) the D_n(k) relation obtained is not single valued, but becomes double valued at low and high curvatures; 4) the limiting angle at the boundary is only approximately constant; and 5) there is no indication of a failure curvature. It seems that, the in view of the calculations, one needs to take another look at the DSD model assumptions.

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