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Detonation Front Curvatures and Detonation Rates LISA M. LAUDERBACH, K. THOMAS LORENZ, EDWARD L. LEE, P. CLARK SOUERS, Lawrence Livermore National Laboratory — We have normalized the LLNL library of detonation front curvatures by dividing lags by the edge lag and radii by the edge radius. We then fit the normalized data to the equation $L=AR^2+ BR^8$, where L is the normalized lag and R is the normalized radius. We attribute the quadratic term to thermal processes and the 8^{th}-power term to shock processes. We compare the % of the quadratic term J at the edge with detonation rates obtained from the size effect. One class of results is made up of fine-grained, uniform explosives with large lags, where a low detonation rate leads to a high J and vice versa. This provides a rough way of estimating unknown rates if the unknown explosive is of high quality. The other, equally-large class contains rough-grained materials, often with small lags and small radii. These have curves that do not fit the equation but superfically often look quadratic. Some HMX and PETN curvatures even show a "sombrero" effect. Code models show that density differences of 0.03 g/cc in ram-pressed parts can cause pseudo-quadratic curves and even sombreros. Modeling is used to illustrate J at the lowest and highest possible detonation rates. This work performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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