Preliminary investigations of the detonation-bow shock interaction: a pictorial essay

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AMRFCT is a newly developed multidimensional compressible fluid dynamics model optimized for solving the Euler and Navier-Stokes equations. The code combines a multidimensional, unsplit flux-corrected transport algorithm (FCT) to solve the reactive-flow conservation equations with a calibrated Chemical-Diffusive Model for conversion of fuel to products with energy release. The effects of obstacles are incorporated by coupling a cut-cell flux redistribution method with the FCT algorithm. Here we describe two-dimensional inviscid simulations performed with AMRFCT to study the interactions of high-speed objects with shocks, flames, detonations, and turbulence for various energetic gaseous mixtures. We illustrate how a detonation interacts with the shock structure generated by supersonic flow over two obstacles: a triangular prism and a circle. Emphasis is placed on how the presence of the obstacles disrupts the flow field. We show how the detonation cellular structure changes as a result of energy deposition during the interaction with bow and oblique shocks. Detonation diffraction and flow expansion over the trailing edge of the obstacles are illustrated using numerical soot foil images. All of the results combined show a sequence of various physical phenomena occurring in a detonation-bow shock interaction.

Try working on something this:

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OLD SENTENCE: These are illustrated by means of various techniques including numerical schlieren, soot foil images, and two-dimensional color contour maps. Then, preliminary insights are presented for the inviscid interaction of a detonation with a bow and oblique shock.

"/" is not an English word

We don't "plot", we graph or map.

We never "scheme".