

Jaime F. Cárdenas-García, Richard Dick,
and William H. Wilson

Overview

The focus of the proposed research program is to design, acquire the components, supervise the manufacture and assemble a split Hopkinson apparatus having multiple diameter, interchangeable bars of 1/2-inch and 3/4-inch diameter. The design should include shielding for testing energetic materials.

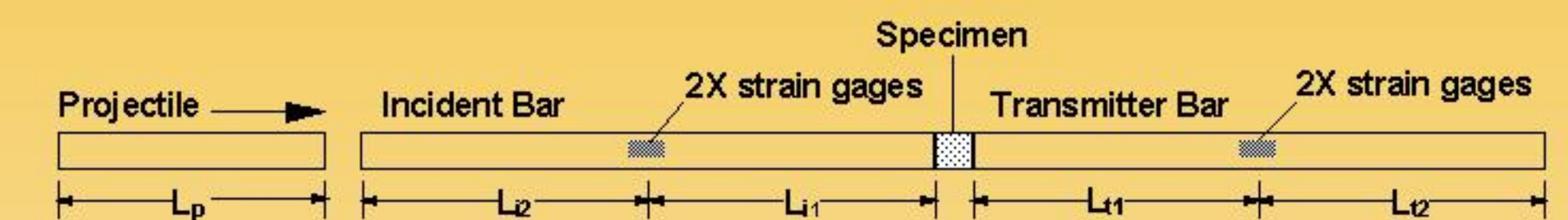
1

Objectives

The focus of the proposed research program is to design, acquire the components, supervise the manufacture and assemble a split Hopkinson apparatus having multiple diameter, interchangeable bars of 1/2-inch and 3/4-inch diameter. The design should include shielding for testing energetic materials.

2

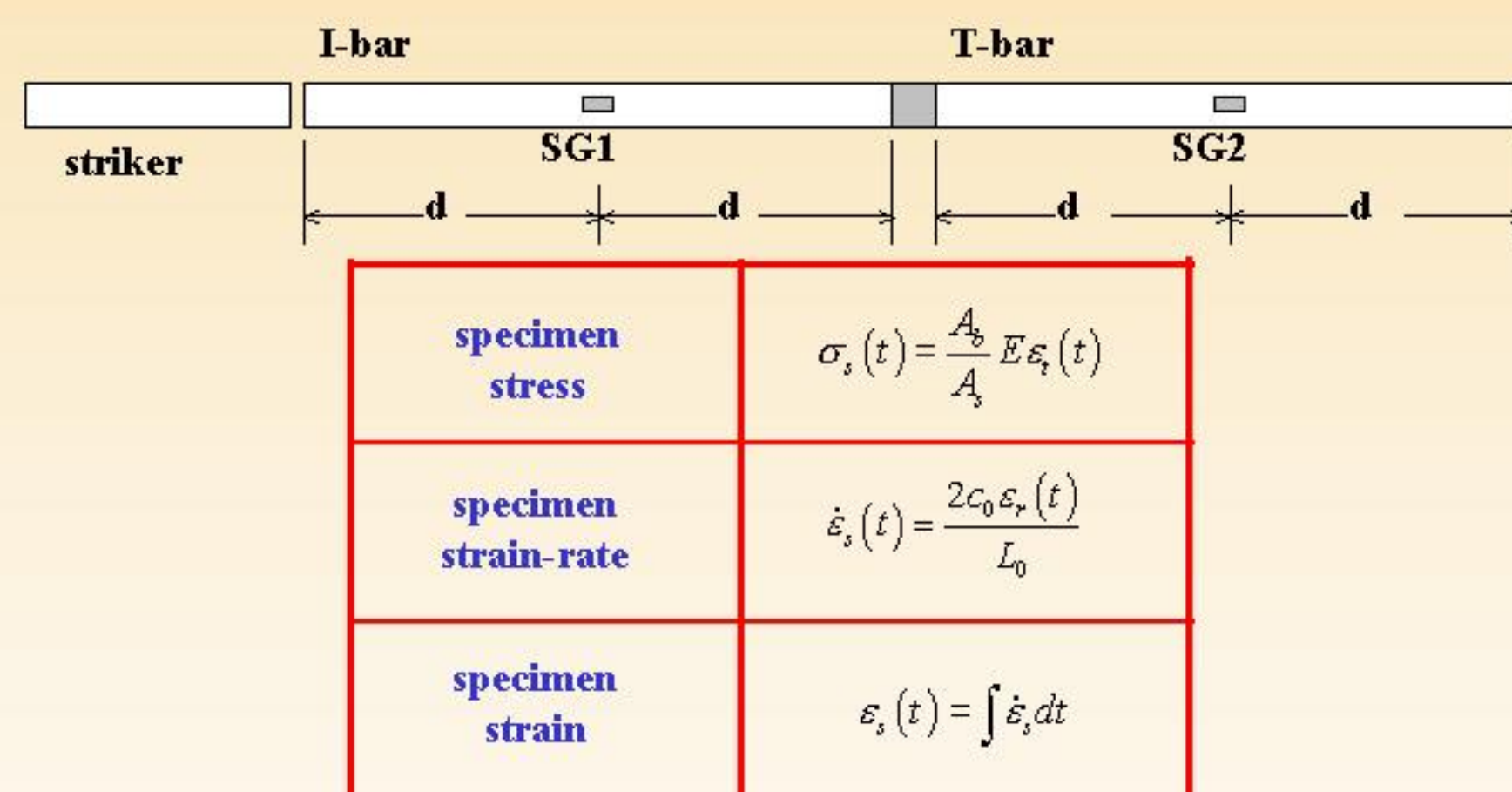
Principles



- Specimen sandwiched between two bars: the *incident bar* and the *transmitter bar*
- *Incident, Reflected, and Transmitted* pulses measured by strain gages
- Gage located at the midpoints of the bars
- Forces and displacements of the specimen ends are found from these strain signals

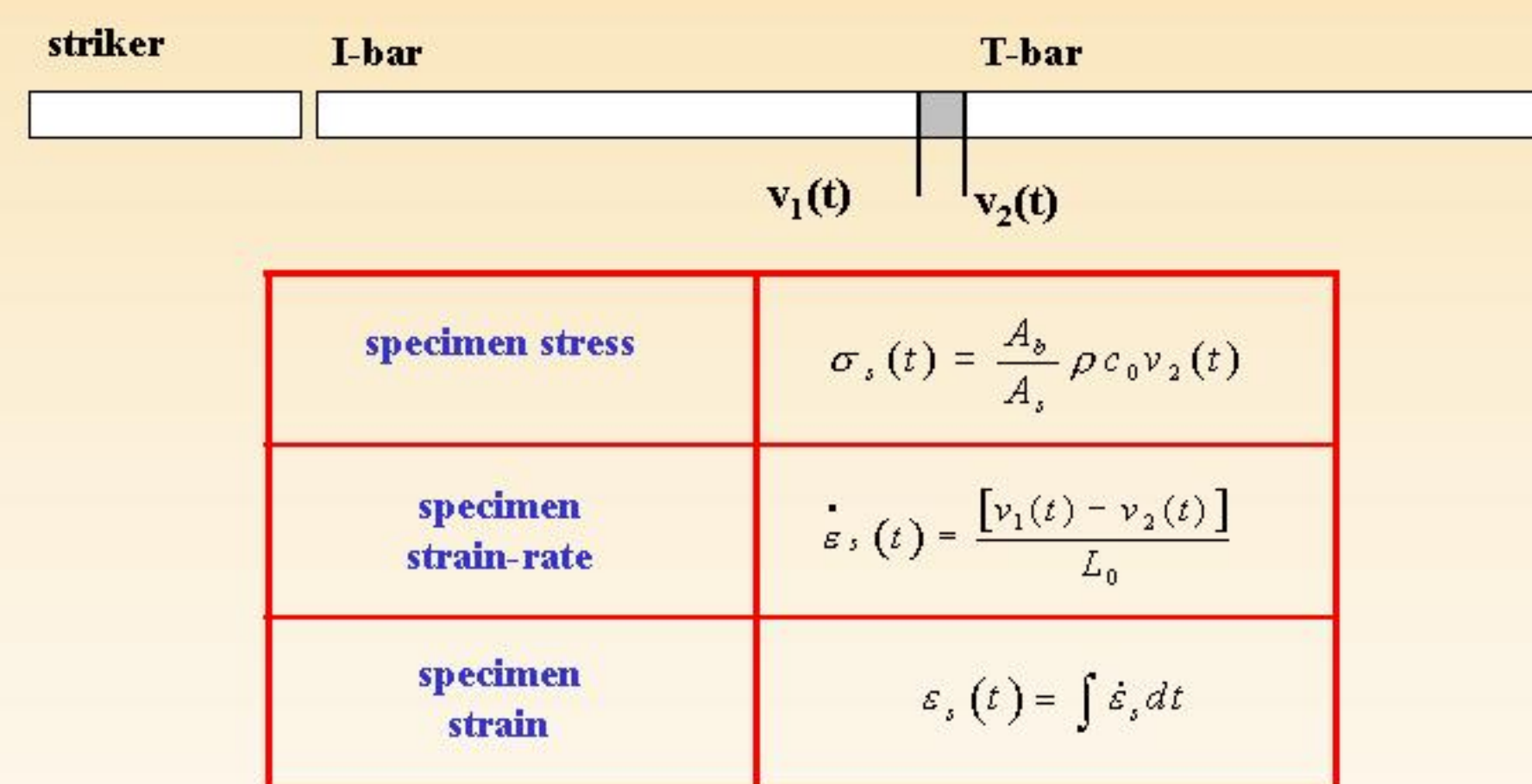
3

Strain Gage Instrumentation



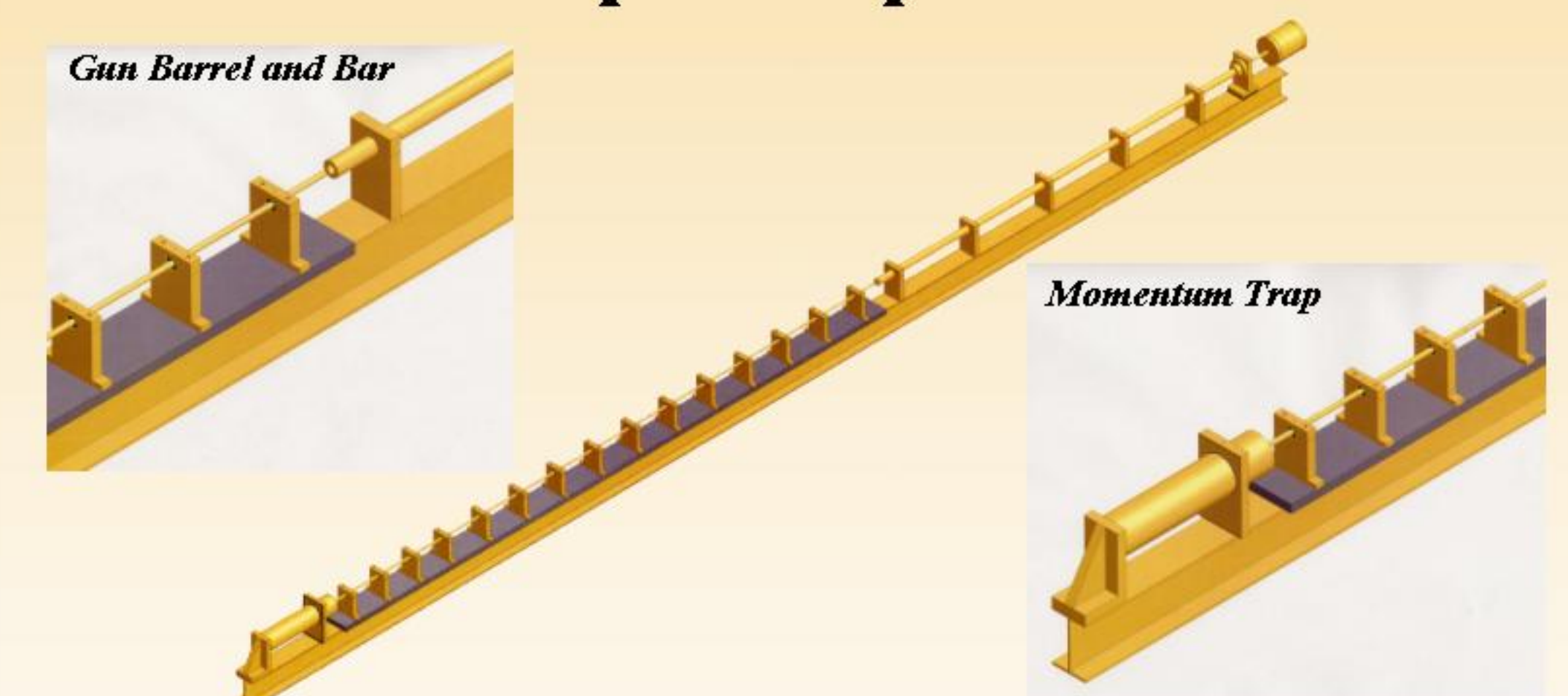
4

Velocity Gage Instrumentation



5

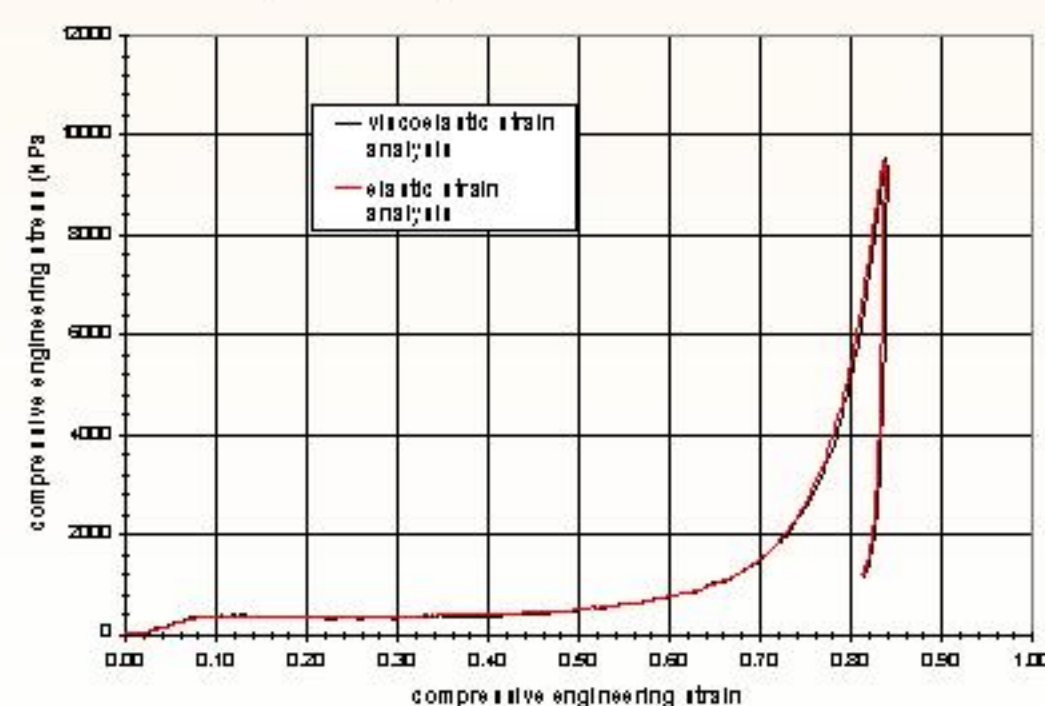
CAD: Split-Hopkinson Bar



6

Typical Split-Hopkinson Bar Results

Low Strain Rate Test - 1500 1/s
Strain Gage Analysis - Elastic vs. Viscoelastic

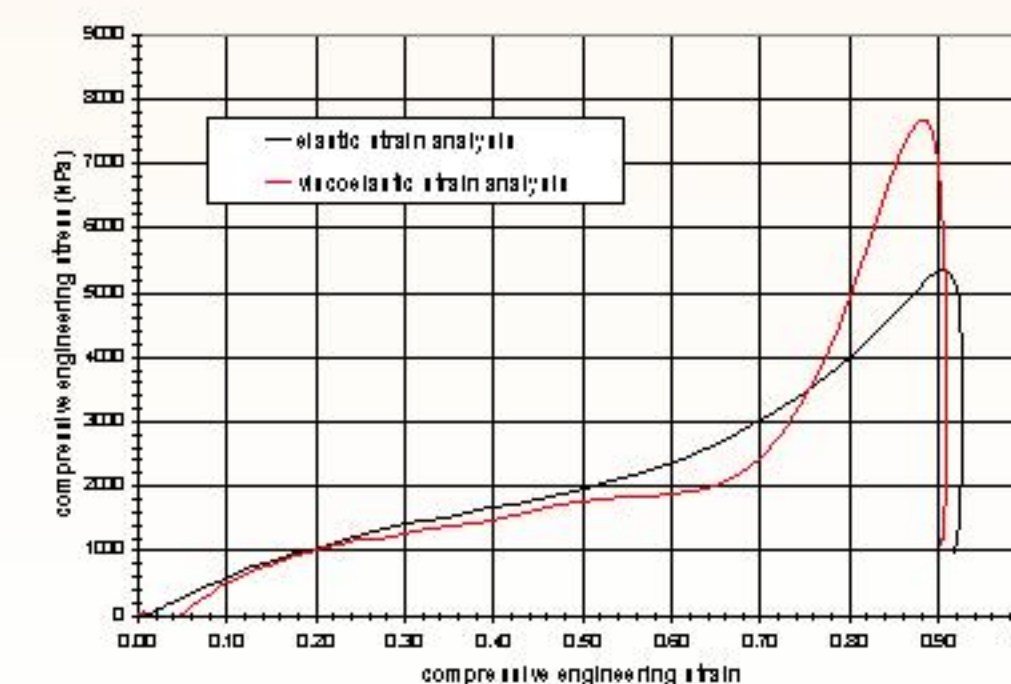


Reference: D.T. Casem, W.L. Founney and P.L. Chang, "A Polymeric Split Hopkinson Pressure Bar Instrumented with Velocity Gages," to appear in *Experimental Mechanics*.

7

Typical Split-Hopkinson Bar Results

High Strain Rate Test - 14,000 1/s
Strain Gage Analysis - Elastic vs. Viscoelastic



Reference: D.T. Casem, W.L. Founney and P.L. Chang, "A Polymeric Split Hopkinson Pressure Bar Instrumented with Velocity Gages," to appear in *Experimental Mechanics*.

8

Conclusions

- The CAD design of the split-Hopkinson bar is complete
- Current efforts are directed toward its manufacturing and assembly
- Ultimately the energy release rate of nanoenergetic materials may be assessed using the split-Hopkinson bar

9