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the split hopkinson pressure bar shpb named after bertram hopkinson sometimes also called a kolsky bar is an apparatus for testing the dynamic stress strain response of materials hopkinson bars history the authors systematically describe the general principles of kolsky bars or split hopkinson bars which are widely used for obtaining dynamic material properties modifications are introduced for obtaining reliable data the split hopkinson pressure bar shpb also known as a kolsky bar is a dynamic system designed to test the high strain rate material properties of various materials a split hopkinson bar or kolsky bar is now a classical characterization technique for determining the dynamic mechanical properties of many materials such as metals ceramics polymers and composites the materials are usually deformed at high strain rates of 10 2 10 4 s 1 in this book leading scientists share their vision on the kolsky hopkinson bar technique a characterization method for dynamics impact and loads a split hopkinson pressure bar shpb also known as a kolsky bar is used to test the high strain rate material properties of materials the hopkinson bar is used to impose a dynamic load on a material specimen akin to that which the material will experience in dynamic situations like vehicle crashes or other high energy events a kolsky bar also widely known as a split hopkinson pressure bar shpb is a characterization tool for the mechanical response of materials deforming at high strain rates 102 104 building on the experience of hopkinson and davies 1948 and kolsky 1949 had independently devised the split hopkinson pressure bar shpb technique that is now commonly used for characterizing the dynamic stress strain response of materials a critical review of three classic papers by b hopkinson rm davies and h kolsky and the state of the art in hopkinson bar experimental techniques is presented the validity and applicability of the assumption made in the 1d hopkinson bar theory are discussed chief among the techniques to measure the dynamic stress strain response of materials is the split hopkinson pressure bar this technique is capable of achieving the highest uniform uniaxial stress loading of a specimen in compression at nominally constant strain rates of the order of 10 3 s 1 and true strains of 0 3 the kolsky bar systems with synchrotron x ray pci technique achieved an image with 500 ns temporal resolution and 2 μm spatial resolution through which the in situ interior of the material system during high rate loading was analyzed split hopkinson kolsky bar design testing and applications the authors systematically describe the general principles of kolsky bars or split hopkinson bars which are widely used for the authors systematically describe the general principles of kolsky bars or split hopkinson bars which are widely used for obtaining dynamic material properties modifications are introduced for obtaining reliable data split hopkinson pressure bar shpb system is significantly used for dynamic material characterization in the range of strain rates 10 2 10 4 s 1 however there is no standard design methodology or readily available technique for the development of this apparatus as in the method devised by hopkinson the pressure is applied normally to one end of a cylindrical steel bar producing a stress pulse which gives rise to radial and longitudinal displacements in the bar kolsky bars also known as split hopkinson pressure bars shpb have long been used for high strain rate materials testing a sample to be tested is placed between two bars this paper reviews a range of published literature on the history of various techniques that have been used for the development of a split hopkinson kolsky pressure bar as applicable for high strain rate

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