



with Out-Of-Plane Shear Mode Consideration, Initially Invented at Arizona State University

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Abstract

Mixed modes I/II/III is an important topic in fracture mechanics. Presently, there are several approaches to characterize materials under pure modes I, II, and III. In contrast, a few apparatuses can characterize mixed modes I, II, and III simultaneously. Crack propagations could be more accurately predicted by implementing all three failure modes. Accurate prediction of crack initiation and propagation would enhance performance and reliability in critical systems in various industries such as semiconductor and aerospace. However, the addition of an out-of-plane shear mode creates sample geometry and loading condition complexities. The author proposes a complementary study to develop the MRMMB fixture for the miniaturized characterization of mixed modes I/II/III to fill the knowledge gaps in fracture mechanics.

Fracture Modes

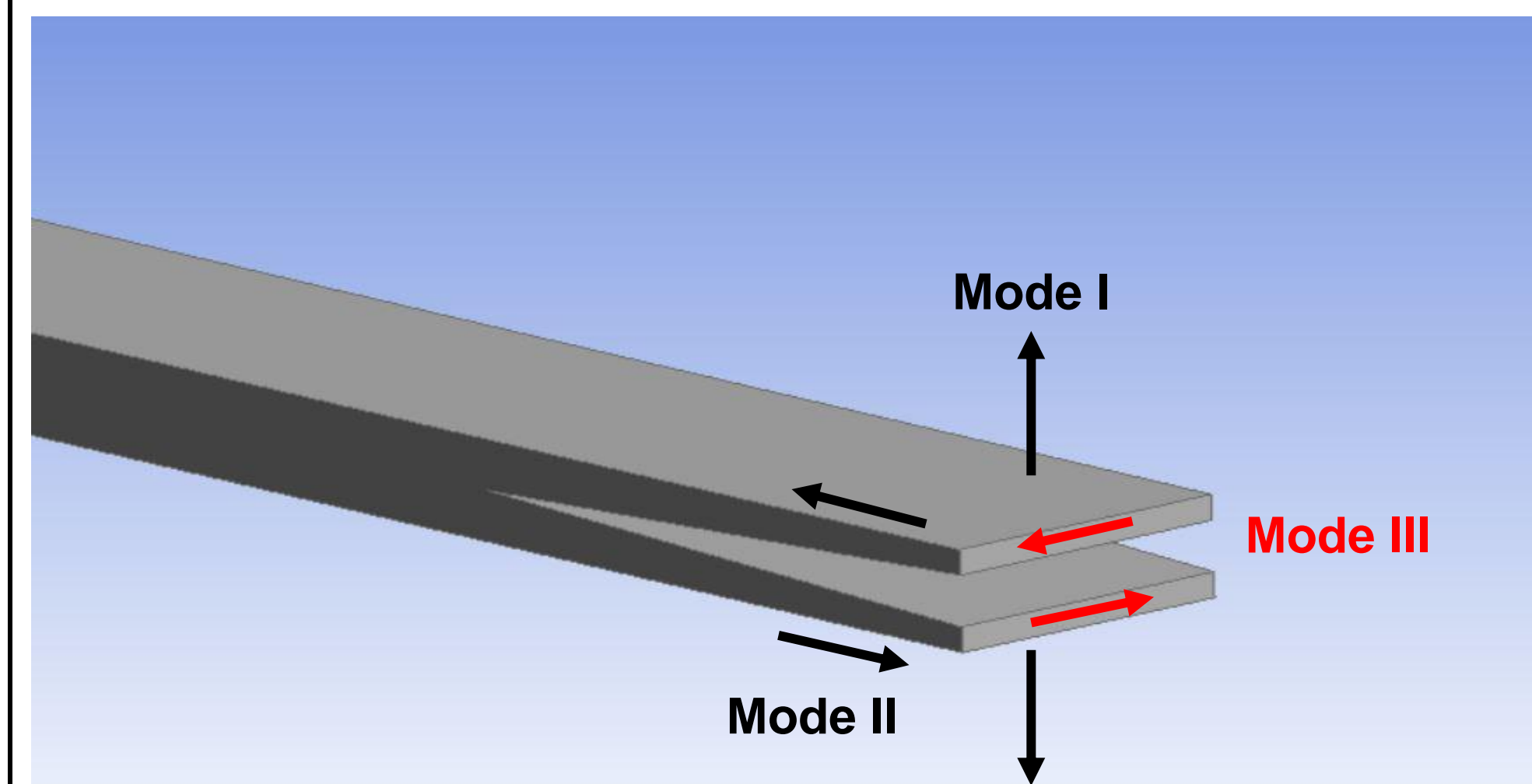
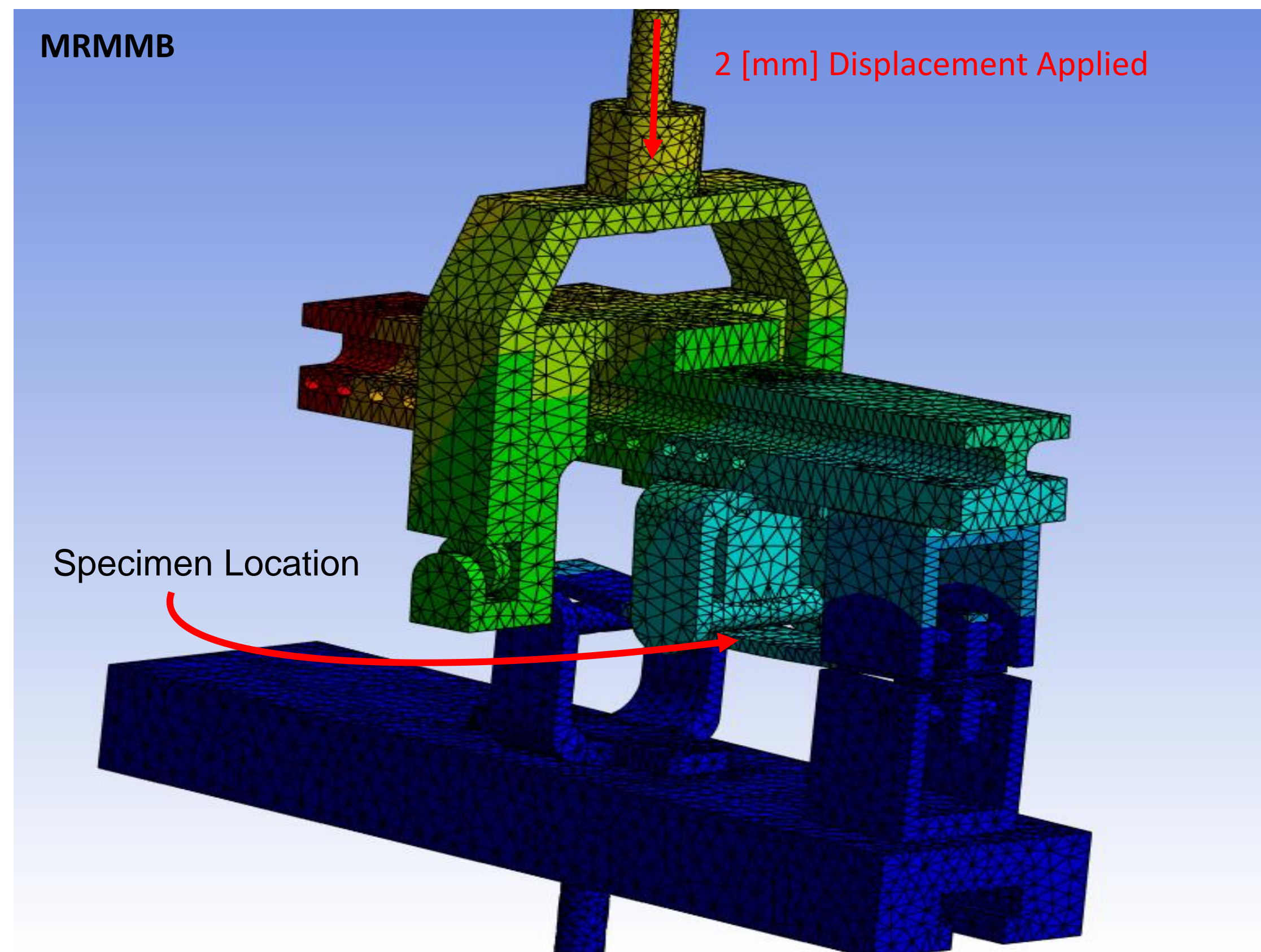


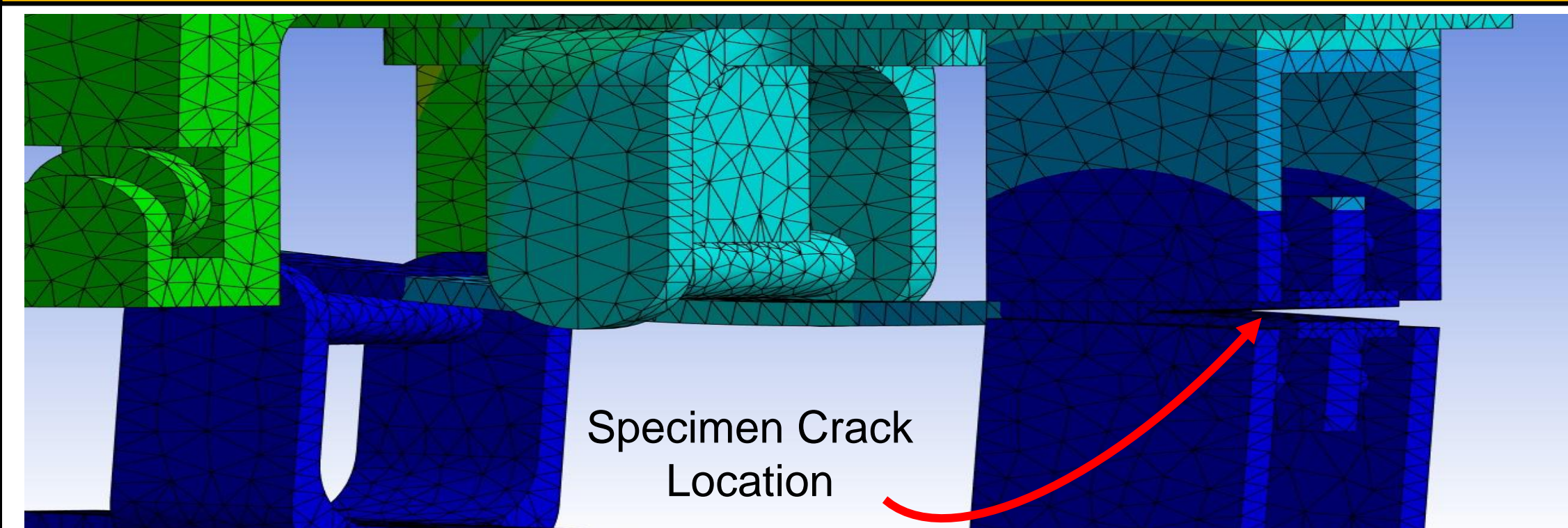
Diagram of Specimen Describing Fracture Modes I & II With the Addition of an Out-Of-Plane Shear Mode III

Finite Element Analysis (FEA)



FEA of MRMMB Apparatus Utilizing Displacement Control

Finite Element Analysis (FEA) Continued



FEA of MRMMB Apparatus Utilizing Displacement Control Highlighting Specimen Crack

Recently Patented Fabricated MRMMB Components



Recently Patented Fabricated MRMMB Components To Be Utilized For Experimental Testing a) Base, Bottom Hinge and Bottom Roller b) Lever, Saddle, Top Hinge c) Base Slider d) Connecting Rod and Yoke e) Top Roller f) Laminated Composite Specimen