NUMERICAL SIMULATIONS OF RIVETED CONNECTIONS UNDER QUASI-STATIC AND DYNAMIC LOADINGS

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ABSTRACT

This research focuses on numerical simulation of riveted steel connections under high rates of loading. Finite element modeling using LS-DYNA is first developed to match the physical testing of A502 Grade 2 riveted structural connections subjected to dynamic and quasi-static shear loadings completed at the U.S. Army Engineer Research and Development Center (ERDC). This initial modeling serves as validation for the LS-DYNA model parameters. Subsequent analyses expand on the validated modeling to serve as a numerical prediction of additional riveted connections subjected to dynamic loads. Results from the testing and numerical simulations can serve to expand the capabilities of existing anti-terrorist planning software and augment existing bridge protection guidelines. The numerical simulation modeling will fill an important gap in the current knowledge base on the performance of riveted connections under high loading rates that will be of value to the U.S. Army Corps of Engineers and the FHWA in their work on bridge security. Understanding the capacity and behavior of these connections will assist future researchers in developing mitigation strategies against blast loadings.

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