

Quasi-Static Analysis of End Plate Beam-to-Column Connections

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Abstract : This paper presents a method for modelling and analysing end plate beam-to-column connections to obtain the quasi-static behaviour using non-linear dynamic explicit integration. In addition to its importance to study the static behaviour of a structural member, quasi-static behaviour is largely needed to be compared with the dynamic behaviour of such members in order to investigate the dynamic effect by proposing dynamic increase factors (DIFs). The beam-to-column bolted connections contain various contact surfaces at which the implicit procedure may have difficulties converging, resulting in a large number of iterations. Contrary, explicit procedure could deal effectively with complex contacts without converging problems. Hence, finite element modelling using ABAQUS/explicit is used in this study to address the dynamic effect may be produced using explicit procedure. Also, the effect of loading rate and mass scaling are discussed to investigate their effect on the time of analysis. The results show that the explicit procedure is valuable to model the end plate beam-to-column connections in terms of failure mode, load-displacement relationships. Also, it is concluded that loading rate and mass scaling should be carefully selected to avoid the dynamic effect in the solution.

Keywords : quasi-static, end plate, finite elements, connections

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