EVALUATION THE EFFECTOF LINK BEAMS' STIFFENERS WITH DIFFERENT CROSS-SECTIONS

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ABSTRACT

Link beams of eccentrically braced frames similar to ductile fuses, in addition to avoiding bracing buckling, attract earthquake energies. Link beams' stiffenershave significant effect in earthquake energy dissipation and their suitable arrangement, causes increasing the rotation capacity of link beams.

In this investigation, link beams with tubular and I-shaped cross-sections that are similar in area, moment of inertia, length and stiffener spacing, were compared together and the effect of link beam section and its stiffeners on the rotation capacityof link beams has been studied. Also in this study, tubular link beams for different values of flange compactness ratio and web compactness ratio were compared together and this question has been answered that the flange compactness ratio has more impact on the rotation capacity of tubular link beams or web compactness ratio?In this investigation, the link beams were modelled in ABAQUS and in order to loading, AISC-2005 loading protocol was used. In this modelling, shell elements for flanges, webs and stiffeners have been utilized and also the nonlinear kinematic hardening plasticity material model has been used.

The result of this investigation indicates that, if link beams with various cross-sections have geometrical similarity, I-shaped link beams will have approximately two times more rotation capacity than tubular link beams and it will be more significant with increasing of flange compactness ratio and link beamlength. Also it can be concluded that flange compactness ratio has more impact on the rotation capacity of tubular link beams, in a way that for one web compactness ratio, with increasing of flange compactness ratio, the rotation capacity decreases approximately 69% but for one flange compactness ratio, with increasing of web compactness ratio, the rotation capacity decreases approximately 36%.

INTRODUCTION

Eccentrically braced frames (EBFs) by covering the advantages of moment-resisting frames (MRFs) and concentrically braced frames (CBFs) have been used as seismic load resisting systems in buildings for more than three decades. In eccentrically braced frames (EBFs), the link beams transmit bracing forces through themselves into the columns and other bracings and, in the end, create dominant forces in the bracings. Link beams, similar to ductile fuses, in addition to avoiding bracing buckling, attract earthquake energies. In EBF systems, failure and yielding should happen in the link beams, and other members of the