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Synthesis and shape memory study of amino acid-based polyurethane

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This paper deals with the hysteretic behavior, analysis and stability evaluation of thin-walled steel tubular columns subjected to cyclic multiaxial (axial and bidirectional lateral) loading. Steel columns are very useful in highway bridge pier construction as it offers flexible space requirement and provides speedy construction. Behavior of steel columns under earthquake-induced loads is rather complicated as earthquakes occur in an oblique direction. However, modern seismic design philosophies have been based on the behavior of structures under independent actions of uni-directional loading in orthogonal directions. In this study, inelastic cyclic behavior of steel columns subjected to axial force together with simultaneous bi-directional cyclic lateral loads is investigated using an advanced finite element analyses procedure. Several types of linear and non-linear idealized loading patterns are employed to check the strength and ductility. The effects of important structural parameters and loading history on the behavior of thin-walled steel tubular columns are examined using the proposed procedure. The obtained results from this study confirm the importance of considering behavior of steel columns under multiaxial loading. The multiaxial tests and finite element analysis results showed that the behavior of a tubular column under multiaxial loading becomes complex and exhibits a circular trajectory once local buckling occurs. The local buckling bulge in the multiaxial loading case tends to develop monotonically due to the circular trajectory. As a result, the residual deformation becomes larger. On the contrary, the unidirectional loading test and analysis are likely to underestimate the damage and the residual displacements caused by an earthquake. It is concluded that the effects of multiaxial loading should be considered in ductility evaluation and seismic resistance design of steel structures.

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