

## Displacement Based Design of Torsional Building

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One of the most important and, at the same time, unpredictable lateral loads is the earthquake load. Extensive research on safe and economical design has been carried out in this field. Researches in this field can be divided into Two general categories: force-based design and performance-based design. Displacement-based design is one of the performance-based methods. In this thesis, has been tried to resolve one of the drawbacks in this method, namely the non-generalization (Completely) of this method for torsionally buildings. For this purpose, the model code of displacement-based (DBD12) is the basis for reviewing the methodology and modifying it. In this code, there are equations for the involvement of the twist effect in the structure analysis, but these equations are not without problems. The main drawback of these relationships is the consideration of nonlinear behavior for earthquake direction and linear behavior in the other direction to calculate torsional stiffness. In this research, three buildings with 4, 7, and 10 floors were selected. Eccentricity in building is assumed equal 0, 5, 10, 15, 20 and 30% of the plan dimension (similar in two horizontal direction). The structural system for the structures is Steel Moment Resisting Frame and the diaphragm of the floors is assumed to be rigid. The study of the accuracy of relationships and the implementation of necessary reforms was done using nonlinear time history analysis. In this analysis, using the OpenSees software, the structures were subjected to 11 records (that were properly scaled), analyzed. After obtaining the results of the precise method and the displacement-based design method, the relationship between the determination of the twisting of the floor mentioned in the code, has been corrected. The accuracy of corrected relationships in comparison with the precise method and the uncorrected correlations has also been investigated, which indicates that the correlation of the results of the correlation relations with the exact values is observed.

### Key Words

Displacement-Based Design, Torsional Buildings, DBD12, Nonlinear Dynamic Analysis, Story Rotation.