
Abstract

In the recent codes for the design of steel structures, the elastic-plastic methods of analysis are recognised to provide an efficient estimation of the ultimate resistance of some of these structures. These methods are usually based on some basic hypotheses, such as the creation of plastic hinges in the most stressed cross-sections, for instance.

As the development of these plastic hinges depends on the interaction between the internal forces and on the cross-section shape, specific equations are required for the analysis of different types of cross-sections. However, most frequently, these equations are not available, or they are expressed by means of simplified expressions; this is usually the case when biaxial bending is involved.

This paper presents new interaction criteria for the analysis of steel rectangular hollow sections subjected to an axial force and biaxial bending moments, at the elastic or the plastic limit states (as long as buckling phenomena are not involved). The plastic interaction criteria are presented, in a first step, for some particular combinations of the internal forces, such as axial loading with bending about a main axis, and biaxial bending without axial loading. Then, the global solution for the simultaneous combination of an axial force and bending moments about both the main axes of inertia are described in detail. All these plastic interaction criteria are compared with the corresponding plastic criteria adopted in the Eurocode 3 (EC3). Some suggestions are presented in order to improve the results given by these EC3 criteria.