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EVALUATION OF THE DEFORMATIONS OF I STEEL CROSS-SECTIONS AT THEIR PLASTIC RESISTANCE LIMIT STATE

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Abstract. *The elastic-plastic methods for the design of steel structures are often based on the hypothesis of the formation of plastic hinges in the most stressed cross-sections. The equations for the evaluation of the internal forces at this cross-section plastic limit state are usually based on equilibrium conditions only, and they do not allow an estimation of the global deformations corresponding to each combination of internal forces. This paper presents a set of analytical expressions for the analysis of doubly symmetrical I-sections, bent over their strong axis of inertia, and rectangular hollow sections, which establish the relationship between the internal forces (axial force and bending moment) and the global deformations (axial deformation and bending curvature) of the cross-section at its plastic resistance limit state. This limit state may be imposed for different levels of ductility of the material, by choosing an adequate maximum value for the material strain in the most deformed fibres of the cross-section.*