The Influence of the Joint Configurations on the Buckling and Post-Buckling Behaviour of Thin Walled Frames

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The use of beam models for the analysis of Thin Walled Structures dates back to the pioneering works of H. Wagner, R. Kappus, S.P. Timoshenko and V.Z. Vlasov. It still receives large attention from the researchers as an advantageous alternative to other approaches that, while giving a more detailed description of the structure under analysis, can lead to cumbersome numerical models.

In this presentation a nonlinear model which is able to describe the mechanical behaviour of thin-walled beams with symmetric or asymmetric cross sections, is used to analyze the buckling and the initial postbuckling of some selected frames.

The analysis is performed in the framework of the Koiter's theory. The attention is focused on the complex question of modelling the nodes, with particular emphasis to the treatment of warping. In fact it is shown that the joint configurations can largely affect the overall behaviour of a frame not only changing its critical load, but also its initial postbuckling slope, that is its imperfection sensitivity. Results concerning the postbuckling behaviour when simultaneous buckling modes are present, will also be shown.