SHS and RHS stainless steel slender members loaded by compression and bending interaction

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Abstract. Behaviour of stainless steel slender members loaded by interaction of axial compressive force and bending moment is investigated in this research. Square hollow sections (SHS) made of austenitic stainless steel grade are considered. An initial numerical parametric study in FE software Abaqus is given and its results are compared to the existing design procedures and design standard rules. The investigated parameters are mainly the column slenderness, section slenderness, ratio between the applied bending moment and axial compressive force and the moment distribution along the member. The necessity of having additional design rules for stainless steels is firstly demonstrated on the values of interaction factors k_y which are significantly higher for stainless steel members due to the material non-linearity with decreased stiffness even at lower stress levels. As an alternative, the General Method is used for comparison to the Abaqus GMNIA model results. The limitation of the method when used for members of non-linear material behaviour is shown and a safe modification of design procedure is suggested.