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OPTIMISATION OF PLANE SWAY FRAME STRUCTURES AGAINST BUCKLING

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ABSTRACT

The report proposes a simple method which optimises the design of plane, rigid no sway frame structures based on the system buckling load. It is centred on either maximising the buckling load or minimising the weight of the structure, or both; and to have all stories buckling at the same time. The method is applied to various frames examples and the results are compared to that obtained from a system buckling analysis performed in the ANSYS Finite Element Analysis (FEA) software. The proposed optimisation procedure proved successful for no sway multi-story rigid frames, as validated by the acceptable percentage differences of below 5% from the FEA analysis. The optimisation method is however limited in its application to multi-story rigid no sway frames only. The methods attempted for the calculation of the system buckling load to account for the influence of adjacent stories of sway frames, was not successful and further development is required.