

## **Abstract**

The purpose of this paper is the determination of flexural stiffness  $EI_x$  and  $EI_y$  of a concrete filled rectangular cross section of a composite steel column, under biaxial bending ( $N$ ,  $M_x$  and  $M_y$ ). The rigidities will be estimated from a theoretical approach using a finite element analysis (element bar with 4 degrees of freedom), based on the equilibrium conditions at mid-span using the moment-curvature relationships ( $M-\Phi$ ) of the deformed element by applying the following equation:  $EI=M/\Phi$ . The material behavior is the one adopted by Eurocode 2 and 3, respectively, for concrete and steel. To validate the theoretical approach used, two comparisons were made: one comparing the rigidities given by the moment-curvature relations versus those calculated by the Eurocode 4, and a second comparison between failure loads of two columns scale one with those tested in the laboratory [2]. Based on the results obtained, we may conclude that the theoretical approach used in this study and the models of behavior of materials are suitable for such problems.