FSplines: A Software for Linear Stability Analysis of Thin-Walled Structures

https://www.academia.edu/49382563/FSplines_A_Software_for_Linear_Stability_Analysis_of_Thin_Walled_Structures_Version_2_0

FSplines: A Software for Linear Stability Analysis of Thin-Walled Structures, Version 2.0

Ángel Chicaiza[1(✉)], Luis Prola[2], Pedro Gala[3],
Cristhian Chicaiza[4], and Marcia Ortiz[5]

[1] Facultad de Ciencias Socio Ambientales, Universidad Regional Amazónica Ikiam, Tena EC150101, Ecuador
angelchicaiza1@gmail.com
[2] School of Technology and Management, Polytechnic Institute of Leiria, 2411-901 Leiria, Portugal
[3] School of Technology and Management, INESC Coimbra, Polytechnic Institute of Leiria, 2411-901 Leiria, Portugal
[4] Sede Académica El Pangui, Universidad Estatal Amazónica, UEA, Puyo EC160101, Ecuador
[5] Ministry of Education of Ecuador, Archidona, Ecuador

Abstract. *FSplines* is a (geometrically) linear stability analysis tool of thin-walled structures with open section (useful for cold-formed steel profiles), that enables obtaining the bifurcation stresses (critical stress, load and moment) and the respective buckling modes by the Finite Strip Method (*FSM*).

The Finite Strip Method: (i) allows analyzing prismatic steel members (commercial structural profiles), (ii) is an alternative to the Finite Element Method (*FEM*), and (iii) has some important advantages over *FEM*. In the present article, two variants of the *FSM* are presented: (i) the Semi-Analytical Finite Strip Method (*SAFSM*), where use is made of trigonometric functions and (ii) the Splines Finite Strip Method (*SFSM*), employing spline functions. The *SAFSM* has the advantage of being less time consuming. Its main restriction is the fact that it only allows modelling simple supported members (pinned restrained). The *SFSM* most important advantage is the ability to model members with all kinds of boundary conditions. This method is, however, more time consuming.

It is worth noting that the bifurcation analysis, performed by the computer application FSplines, is required for the design of cold formed members according to the specifications of international standards.

FSplines 2.0 is the second version of the computer application here presented. In this second improved version more cross-sections are available, and more section properties are presented.

© 2020 All rights reserved.

Keywords: Cold formed structural profiles · Open cross-section thin walled structures · Buckling modes · FSplines 2.0 · Bifurcation stresses · Linear stability analysis · Finite Strip Method