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# A refined FSDT for the static analysis of functionally graded sandwich plates

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[Cite this publication](#)1st **JL Mantari**

31.87 · Universidad de Ingeniería y Tecnología (Peru)

2nd **E.V. Granados**

## Abstract

This paper presents a static analysis of functionally graded plates (FGPs) by using a new first shear deformation theory (FSDT). This theory contains only four unknowns, with is even less than the classical FSDT. In this paper a simply supported FG square sandwich plate is subjected to a bi-sinusoidal load. The governing equations for static bending analysis are derived by employing the principle of virtual works. These equations are then solved via Navier-type, closed form solutions. The accuracy of the present theory is ascertained by comparing it with various available solutions in the literature.

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The buckling and bending problems were solved. Magnucki et al. (2016) formulated two analytical models of a seven-layer steel beam with a transverse sinusoidal corrugated main core and two sandwich facings with steel foam cores, and solved the problem of bending and buckling. Cheon and Kim (2015) suggested an equivalent plate model to analyze the mechanical behaviour of corrugated-core sandwich panels under tensile and bending loads. Mantari and Granados (2015) presented a static analysis of functionally graded plates. In the paper, a simply supported square sandwich plate was subjected to a bi-sinusoidal load. Vaidya et al. (2015) investigated the response of sandwich steel beams with corrugated cores to quasi-static loading by employing experimental and computational approaches.

## Strength of a metal seven-layer rectangular plate with trapezoidal corrugated cores

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These results are compared with the quasi-3D solutions [57,59,60] and FSDT [58] results. The shear correction factor of Ref. [58] is utilized to be  $K = 5/6$ . It can be noticed from this table that values of deflection and shear