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«Elastic bend of twisted waveguide»

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Problem statement

• Until recently, waveguides in antenna-feeder systems did not count for strength and rigidity, as it had overly large wall thickness of 3-4 mm.

• This paper considers the stress and deflection of a twisted waveguide at bending as the most common and dangerous type of loading.
Solution methods

• We examine the bending of twisted waveguides on the basis of the Euler–Bernoulli beam theory;
• According to the Euler–Bernoulli beam theory, the stress and bending deflections of the twisted waveguide are inversely proportional to the integral characteristics of the cross section.
Conclusions

Results, implementation

• In this paper, the Euler–Bernoulli beam theory has been chosen to evaluate the general distribution of stress and deflection, in a twisted waveguides at bend.

• The ratio of maximum to minimum values for moments of inertia and the section modulus are equal to:

\[ k_j = \frac{I_{\text{MAX}}}{I_{\text{MIN}}} \approx \frac{B}{H} \]

\[ k_w = \frac{W_{\text{MAX}}}{W_{\text{MIN}}} \approx \left(\frac{B}{H}\right)^2 \]

• It is rational to use in solve the worst combination of geometric parameters relative to a load direction

\[ I_w = \min(I_x, I_y) \quad W_w = \min(W_x, W_y) \]

• The shell model of a twisted waveguide is expected to be developed in further research and allow to obtain a more accurate assessment of stresses and deflections.
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