

STUDENT PRIZE WINNER TALK**TWISTED STRUCTURES AND THEIR APPLICATION AS
ACCELERATING STRUCTURES**

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Abstract

Normally, reactive loading is employed to construct accelerating cavities in order to slow the phase velocity of the electromagnetic wave. However, due to their non-uniform cross section, they tend to be difficult to machine, requiring complicated welding or brazing processes which increase the total cost. Although empty straight waveguides can only support faster-than-light propagation, empty twisted waveguides can support propagation at or below c . Because twisted structures have a uniform cross section in the transverse plane, they offer several potential advantages over dielectric loaded structures or other types of periodic structures. Of particular interest are twisted structures whose longitudinal cross section has been selected to resemble well-known accelerating structures, such as the iris-loaded accelerating structure and the TESLA type elliptical cavity. Comparisons are drawn between these conventional cavities and their twisted counterparts. Specifically, the phase velocity and dispersion relationship are discussed, the accelerating mode is found and analyzed, and R/Q is calculated. Design guidelines for the design of twisted structures are given.

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