Abstracts

Symmetry-Induced Modal Characteristics of Uniform Waveguides -- II: Theory

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The application of symmetry analysis to uniform waveguides is discussed. Symmetry analysis provides exact information concerning mode classification, mode degeneracy, modal electromagnetic- field symmetries, and the minimum waveguide sectors which completely determine the modes in each mode class. This paper provides a summary of the development. that leads to the results concerning symmetry-induced modal characteristics of uniform waveguides discussed in the previous paper. Some of the concepts of group theory are introduced, including the irreducible representations of symmetry groups. The use of the irreducible representations to determine the mode classes and their degeneracies is described. The projection operators belonging to the irreducible representations are introduced and their application to determining the azimuthal symmetry of the modal fields is explained. The minimum waveguide sectors for the mode classes are obtained from the azimuthal symmetry of the modal fields.

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