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Propagation of Guided Modes in Curved Nanoribbon Waveguides
ZHUO YE, XINHUA HU, MING LI, Iowa State University, KAI-MING HO, Ames Laboratory, PEIDONG YANG, Iowa State University — We develop a planewave-based transfer matrix method in curvilinear coordinates to study the guided modes in curved nanoribbon waveguides. The problem of a curved structure is transformed into an equivalent one of a straight structure with spatially-dependent tensors of dielectric constant and magnetic permeability. The dispersion curves, mode profiles, and self-transmission of guided modes are obtained for the curved waveguides. Oscillations in the self-transmission as a function of wavelength are found to increase in amplitude as the bend becomes sharper. The period of the oscillations decreases with increase in size of the bending region. We show that curved sections can result in strong oscillations in the transmission spectrum similar to the recent experimental results in [M. Law, D. J. Sirbuly, J. C. Johnson, J. Goldberger, R. J. Saykally, P. Yang, Science **305**, 1269(2004)].

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