
A conformal mapping approach to broadband nonlinear optics on chip

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Integrated nonlinear optical devices are crucial in modern optical communications. However, there still lack a universal method for designing such devices on chip. Transformation optics (TO) is a novel optical designing method that allows for the manipulation of electromagnetic waves by engineering the permittivity and permeability across space and time. In particular, conformal transformation optics (CTO) eliminate the extreme anisotropy that hampers the experimental realization of TO, and has been observed in many interesting phenomena. But these applications are all about linear optics, none of them consider its potential applications in nonlinear optics. In this work, we firstly demonstrate a CTO approach, which offers an effective strategy for realizing broadband nonlinear optical processes on chip. This strategy provides the design of curved accelerating waveguides with spatially gradient curvatures that able to achieve broadband nonlinear frequency conversion on chip. We highlight this approach is a general method, independent of specific materials, and is suitable for various nonlinear optical processes.

Short Bio: **Hui Liu**

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Introduction:

Professor at the School of Physics, Nanjing University, Vice Director of the National Laboratory of Solid State Microstructures in Nanjing, Vice Dean of the School of Physics at Nanjing University, recipient of the National Distinguished Youth Science Fund, Executive Director of the National Electromagnetic Research Association, and Deputy Editor-in-Chief of the Journal of Optics. Mainly engaged in research on nonlinear photonic crystals and nonlinear optical metamaterials. He has undertaken projects such as the Nanotechnology Special Project of the Ministry of Science and Technology and major projects of the Natural Fund, and has won awards such as the First Prize of the Chinese Optical Science and Technology Award, the Wang Daheng Optical Award of the Chinese Optical Society, the Jiangsu Province Optical Science and Technology Award, the Important Optical Achievements Award of China, the First Prize of Jiangsu Province Science and Technology, and the National Teaching Achievement Award.

