Allan D Boardman, Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C5-025

31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

Allan D Boardman

University of Salford, UK

Dramatic new rogue and solitonic pathways controlled by meta-materials

Advanced meta-materials are now becoming popular artificial materials that can deploy complex graphene structures and uniaxial layered dielectric creations. Layered sub-wavelength systems are experimentally attractive and relatively, easily controlled compared to the classic double negative devices. New pathways for advanced meta-materials clearly involve solitons but in the nonlinear domain rogue waves deliver a dominant interest. These are shown here to lead to novel, dramatically exciting behavior. It will be shown how, in addition to meta-material controlling influence, nonlinearity and elegant magneto-optic control can be readily included, through a novel methodology based around forms of the nonlinear Schrödinger equation that include stationary and non-stationary effects. It can be, often, difficult to generate the Schrodinger equation for advanced substances like hyperbolic meta-materials but the developments shown here, based upon type II hyperbolic, readily permit the investigation of both temporal and spatial solitons. Additionally, the possibility of terahertz wave amplification, based upon graphene, with inverse population of carriers in the epsilon-near-zero regime is demonstrated. Type II meta-materials will be fully investigated with the inclusion of nonlinear, non-stationary diffraction and dispersion. Rogue waves have captured interest in a broad band of areas because of their hydrodynamic origin and here we will pursue new electromagnetic pathways. New types of soliton interaction devices will also be presented alongside this fascinating discussion of rogue waves. It will be shown that, when symmetry is an issue, the optic axis must always be in a carefully frozen position in any realistic application. It is quite dramatic that its position could overwhelm absorption. Controlled generation of high-intensity single- or multi- rogue waves will be demonstrated by induced modulation instability leading to some new broad-based applications, especially in the biological domain.

Biography

Allan D Boardman from the UK University of Salford is a worldwide Expert on the Global Revolution known as meta-materials that is now transforming science. He was the Co-Chair of this huge meta-material conference under the photonics Europe heading. He holds a Doctor of Science degree from the University of Durham and is responsible for 328 peer-reviewed and other publications, generating 5432 citations. He has been Topical Editor for the Journal of the Optical Society of America B for meta-materials. He is a Fellow of the SPIE and a Fellow of the Optical Society of America. He is also a Fellow of the UK Institute of Physics and the Institute of Mathematics and its Applications.

A.D.Boardman@salford.ac.uk

Notes: