EXTREMELY NARROW, SHARP-PEAKED RESONANCES AT THE EDGE OF THE CONTINUUM

Ignas Lukosiunas, Lina Grineviciute, Julianija Nikitina, Darius Galevicius, Kestutis Staliunas

1. Vilnius University, Faculty of Physics, Laser Research Center, Sauletekio Ave. 10, Vilnius, Lithuania
2. Center for Physical Sciences and Technology, Savanoriu Ave. 231, LT-02300 Vilnius, Lithuania
3. ICREA, Passeig Lluís Companys 23, 08028 Barcelona, Spain
4. UPC, Dep. de Fisica, Rambla Sant Nebridi 22, 08222, Terrasa (Barcelona) Spain

The resonant interaction between propagating waves in the cavity is encountered in the broad range of systems in nature and technology. It is a classical problem in wave mechanics and such topic became extremely popular during the recent years in the field of micro-, nano photonics and plasmonics, and specifically, with the Fano resonances in such optical systems. Primarily, it can act as a reflection filter and a polarizer for incident light beams due to its guided mode resonance effect [1].

We therefore a critical narrowing of Fano resonance in a driven asymmetrical finite potential well. The resonances possess sharp-peak reflection properties at the continuum boundary and such situation can be realized for an electromagnetic wave propagating across the dielectric thin films with a periodically modulated interface. We generalize such phenomenon in our simplified semi-analytical model of a driven finite quantum potential well as well as by rigorous numerical wave analysis of Maxwell equations [2] for the wave propagation across the thin 2 Dimensional film with a periodically modulated interface in a transverse direction in reference to the beam propagation direction. We justify the phenomenon experimentally, by the measurements of light reflection from the dielectric thin film deposited on a periodically modulated surface. Practical applications of such resonances involve sharp, narrow spectral beam filters, spatial light filters, polarizers and light couplers [3-6].

References
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