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Classical analogy of Fano interference[1] ARKADY SATANIN, YONG JOE, Ball State University — The resonances are main object of theoretical and experimental investigations in modern physics and the concept of resonances is ubiquitous in teaching. Fano resonance is phenomena of the interference between the configurations of discrete level and continuum [1]. The main purpose of present work is to give a simple explanation of the nature of Fano resonances. First, we briefly introduce a general feature and manifestation of resonances. We study basic ideas of resonance manifestation in simple mechanical systems by considering a single oscillator and two coupled oscillators. These models provide a main idea about an analytical zero-pole structure of amplitude and phase behaviors near the resonances. Therefore, we obtain the physical meaning of the zero amplitude in these systems. Second, we examine the Fano interference in quantum systems within the help of similar analogy with oscillators. As an example of quantum interference, we give a detailed examination of wave interference in a waveguide with an embedded attractive potential (quantum dot). In particular, the interference between the narrow group of states (quasi-bound or decaying states) and the continuum will be analyzed. We present a general expression for the scattering amplitude with a complex coupling parameter and an explicit expression for the Fano-profile. [1] U. Fano, Phys. Rev. **124**, 1866 (1961).

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