Bozhko, Andrii. *Physical Boundary as a Source of Anomalies in Transport Processes in Acoustics and Electrodynamics*. Doctor of Philosophy (Physics), December 2018, 138 pp., 1 table, 27 figures, numbered references.

Various anomalous effects that emerge when the interfaces between media are involved in sound-matter or light-matter interactions are studied. The three specific systems examined are a fluid channel between elastic metal plates, a linear chain of metallic perforated cylindrical shells in air, and a metal-dielectric slab with the interfaces treated as finite regions of smoothly changing material properties. The scattering of acoustic signals on the first two is predicted to be accompanied by the effects of redirection and splitting of sound. In the third system, which supports the propagation of surface plasmons, it is discovered that the transition region introduces a nonradiative decay mechanism which adds to the plasmon dissipation. The analytical results are supported with numerical simulations. The outlined phenomena provide the ideas and implications for applications involving manipulation of sound or excitation of surface plasmons.