МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ

# ФІЗИКА, ЕЛЕКТРОНІКА, ЕЛЕКТРОТЕХНІКА

# ФЕЕ :: 2017

## МАТЕРІАЛИ
## та програма

НАУКОВО-ТЕХНІЧНОЇ КОНФЕРЕНЦІЇ

(Суми, 17–21 квітня 2017 року)

Суми
Сумський державний університет
2017

**Electrodynamic properties of defects in photonic crystals**

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Now the electrodynamic systems of terahertz range devices are being improved due to the rapid development of synthetic material media possessing the property of periodicity in several directions which are call photonic crystals.

The implementation of field interaction of photonic crystals with electron beams or dielectric waveguides is based on the formation of linear disturbances of their periodicity, these disturbances having strongly expressed waveguide properties.

A hollow channel in a photonic crystal can be used for transmitting a linear electron beam that interacts with a certain waveguide mode. This approach is used to forma such accelerating systems, where electrons interact with fast waves of a photonic crystal waveguide in the course of their motion.

The dispersive properties of photonic crystal structures coused by the presence of photonic band gaps of interferential origin provide for electromagnetic energy localization in the defect regions. Photonic crystal waveguides (linear defect) and resonators (local defect) are formed on this basis.

The violation of the spatial periodicity complicates the electrodynamic analysis due to lack of translation symmetry. For simple shape defects it is possible to use plane-wave method for determining their eigen modes of the investigated structure. The easiest way of forming waveguide channels is to create a linear defect by changing physical properties of a number of elements, for example, changing their dielectric constant and the diameter of a number of cylinders, or deleting rows. Hollow waveguides are suitable for interaction of wave waveguides with radiation sources.

It is established that electromagnetic properties of photonic crystal structures do not depend on the direction of wave propagation. A wave is totally reflected from the media boundary line with an arbitrary angle of incidence. Hence it is possible to create photonic-crystal waveguides with almost arbitrary bends.

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