Radiation from Relativistic Electrons in Periodic Structures "RREPS-15"



Contribution ID: 41

Type: Poster

## Electromagnetic field in a circular waveguide with the boundary between a vacuum area and an area having a cylindrical dielectric layer

Tuesday 8 September 2015 18:00 (1h 30m)

We consider a mode transformation in the circular waveguide with a vacuum part and a part having cylindrical dielectric layer. The problem is analyzed for axially symmetric mode (propagating or evanescent) falling in two cases: a mode falls from the vacuum part and a mode falls from the partially dielectric part.

Analytical investigation is performed by crosslinking method. In the cases of a narrow channel and a thin dielectric layer, the approximate solution has been constructed. When the channel radius is small the mode with number of incident mode is mainly excited in reflected and transmitted field. For the case of a thin dielectric layer the excitation coefficient of transmitted mode with a number of incident mode tends to unity while all reflected modes are proportional to the first order of small parameter. However, in the case of mode falling from dielectric part the amplitude of the reflected mode with a number of incident mode is of second order of small parameter.

In order to analyze the mode transformation in general case the numerical algorithm has been constructed. Typical behavior of the reflection and transmission coefficients depending on channel radius is obtained. In particular, it can be shown, that the evanescent incident mode can excites propagating modes in reflected and transmitted fields.

Author: Ms GRIGOREVA, Aleksandra (Saint Petersburg State University)
Co-author: TYUKHTIN, Andrey (Saint Petersburg State University)
Presenter: Ms GRIGOREVA, Aleksandra (Saint Petersburg State University)
Session Classification: Poster Section

Track Classification: 2. Transition Radiation