

## Interesting Behavior of Non-Thermal Plasma Photonic Crystals

**Authors :** A. Mousavi, S. Sadegzadeh

**Abstract :** In this research, the effect of non-thermal micro plasma with non-Maxwellian distribution function on the one dimensional plasma photonic crystals containing alternate plasma-dielectric layers, has been studied. By using Kronig Penny model, the dispersion relation of electromagnetic modes for such a periodic structure is obtained. In this study we take two plasma photonic crystals with different dielectric layers: the first one with Silicon monoxide named PPCI, and the second one with Tellurium dioxide named PPCII. The effects of the plasma layer thickness and the material of the dielectric layer on the plasma photonic crystal band gaps have been illustrated in the dispersion relation and the group velocity figures. Results revealed that in such a system, the non-thermal plasma exerts stronger limit on the wave's propagation. In another word, for the non-thermal plasma photonic crystals (NPPC), there are two distinct regions in the dispersion plot. The upper region consists of alternate band gaps in such a way that both width and length of the bands decrease gradually as the band gaps order increases. Whereas in the lower region where  $v_{ph} > 20 c$  (for PPCI), waves will not be allowed to propagate.

**Keywords :** band gap, dispersion relation, non-thermal plasma, plasma photonic crystal

**Conference Title :** ICPP 2015 : International Conference on Plasma Physics

**Conference Location :** Stockholm, Sweden

**Conference Dates :** July 13-14, 2015