

# Research of Dispersion Characters in Hexagonal Photonic Crystal Fiber Based on a COMSOL Multiphysics® Model

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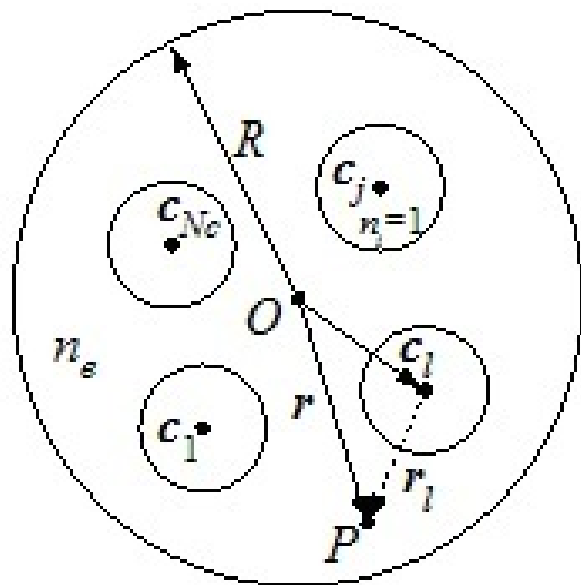
## Abstract

It is a complex problem to calculate the photonic crystal fiber model, and the methods of plane wave expansion, Hermite-Gaussian function and beam propagation have been analyzed. Finally the multipole method is adopted for solving problem. The hexagonal air holes in cladding have been studied based on COMSOL Multiphysics® Software. The diameter of the air hole and hole spacing ratio which may affect the dispersion has been found and the geometrical structure which has small air holes near the center also has been analyzed. The results show that if the diameter of the air hole is the same, when the ratio of the air hole and hole spacing will increase, the effective refractive index will decrease and the dispersion will be increased. There are small air holes in the center, the smaller the diameter of the small air hole is, the greater the effective refractive index and dispersion are. When the diameter of the small air hole keeps constant, the greater the ratio of the big air hole diameter and hole spacing is, the greater the dispersion is. When the ratio of the big air hole and hole spacing is 0.6, the PCF with six small air holes near the center has better negative dispersion.

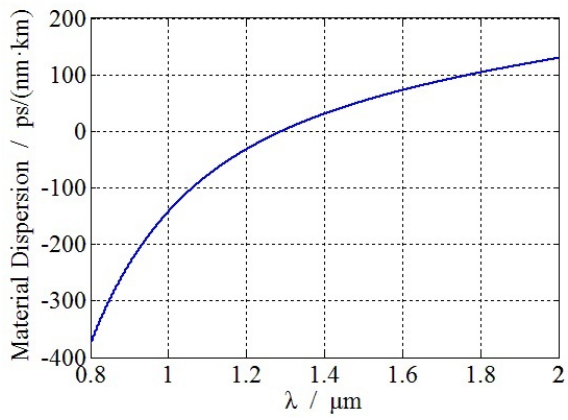
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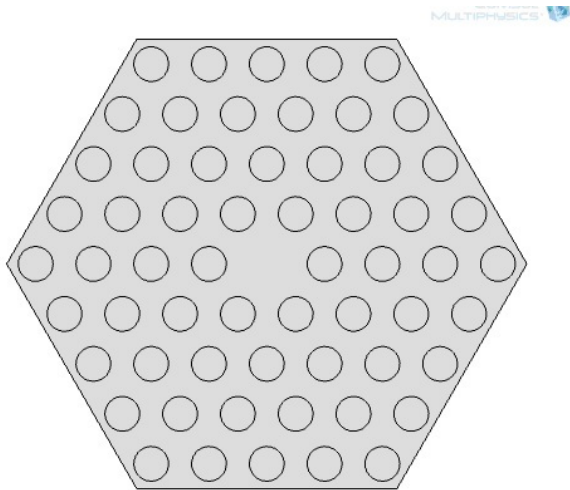
## Figures used in the abstract



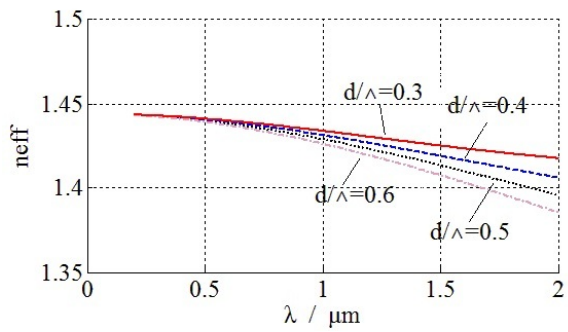
**Figure 1:** PCF section.



**Figure 2:** Material Dispersion of PCF.



**Figure 3:** PCF section without little hole around the center.



**Figure 4:**  $n_{\text{eff}}$  relationship with wave length and  $d/\lambda$ .