



Iranian Journal of Physics Research, Vol. 13, No. 1, 2013

## Longitudinal mode structure in a non-planar ring resonator

M Jaberi<sup>1,2</sup>, A H Farahbod<sup>1</sup>, and H Rahimpur Soleimani<sup>2</sup>

1. Laser and Optics Research School, Nuclear Science and Technology Research Institute, Tehran

2. Department of Physics, Guilan University, Rasht.

E-mail: afarahbod@aeoi.org.ir

(Received 1 August 2012 ; in final form 6 December 2012)

### Abstract

The structure of longitudinal modes of a passively Q-switched, non-planar unidirectional ring-resonator, with Nd:YAG active medium is described in this article. Two different techniques are used to study the longitudinal mode structure of the laser resonator. At first, the fast-fourier transform technique is applied for analyzing the mode beating of the optical fields by intensity frequency structure of the laser pulses to determine the number of longitudinal modes. Then, an analyzer etalon is used to observe Fabry-Perot fringes to compute the numbers of the resonator longitudinal modes. The results of two techniques are in good agreement with each other. Under the proper conditions, a reliable single longitudinal mode of the non-planar ring-resonator can be achieved with a good spatial mode profile that originates from the unidirectional travelling optical field propagation in the resonator having a very low sensitivity of the non-planar ring resonator to the optical elements misalignment.

**Keywords:** unidirectional non-planar ring resonator, mode structure, etalon, Fabry-Perot interferometer

For full article, refer to the Persian section