

# Influence of mode coupling on three spatially multiplexed channels in multimode graded index plastic optical fibers

S Savović<sup>1,2</sup>, A Djordjevich<sup>2,\*</sup>, A Simović<sup>1</sup> and B Drljača<sup>3</sup>

<sup>1</sup> Faculty of Science, University of Kragujevac, R. Domanovića 12, 34000, Kragujevac, Serbia

<sup>2</sup> Department of Mechanical Engineering, City University of Hong Kong, Kowloon, Hong Kong, People's Republic of China

<sup>3</sup> Faculty of Science, University of Priština, L. Ribara 29, Kosovska Mitrovica, Serbia

E-mail: [mealex@cityu.edu.hk](mailto:mealex@cityu.edu.hk)

Received 4 July 2020

Accepted for publication 27 September 2020

Published 27 October 2020



CrossMark

## Abstract

The influence of mode coupling on three-channel spatial division multiplexing capability in multimode graded index plastic optical fibers is investigated by solving the power flow equation. Our numerical results show that mode coupling significantly limits the fiber length at which the spatial division multiplexing can be realized with a minimal crosstalk between three neighbor spatial optical channels. Three spatial channels in the multimode graded index plastic optical fiber can be employed with a minimal crosstalk up to the fiber length of 3.5 m, which is about 12.5% of the coupling length (fiber length where equilibrium mode distribution is achieved). Such characterization of multimode graded index plastic optical fibers should be considered in designing an optical fiber transmission system for space division multiplexing, particularly for small office networking.

Keywords: plastic optical fibers, graded index optical fibers, space division multiplexing, mode coupling

(Some figures may appear in colour only in the online journal)

---

\* Author to whom any correspondence should be addressed