



### **Optical fiber Effective Area Measurements** (M.sc.ing. A. Supe, Dr.sc.ing. J. Porins)

One of limiting factors for data transfer capacity in fiber optics transmission systems is optical fiber nonlinear response to high intensity optical radiation. The main reason for optical signal high intensity is optical fiber core size. For single mode fiber it is typically around  $10\mu\text{m}$  in diameter. In addition optical field in a telecommunications single mode fiber is not evenly distributed or even fully contained within the core. It is larger at the fiber central axis than near the core-cladding interface and extends even into the cladding depending on the actual refractive index profile. The real optical fiber refractive index profile is dependent on the fiber type and the manufacturing process and therefore not always can be accurately determined. The effective area parameter  $A_{\text{eff}}$  has been defined for the purposes of calculating nonlinear effects. It is a single value, based on the modal field distribution, and can be used to calculate a value of optical intensity.

In our research we used transverse offset technique for optical fiber  $A_{\text{eff}}$  measurements. Our measurement scheme consists of tunable laser source, micro-positioner and wavelength and power meter. Micro-positioner was used to precisely shift two optical fiber ends thus realizing effective area measurement method using far field optical intensity distribution measurements.  $A_{\text{eff}}$  results for telecommunication standard single mode fiber ITU-T G.652 are  $53.12\mu\text{m}^2$  at  $1520\text{nm}$ ,  $54.19\mu\text{m}^2$  at  $1550\text{nm}$  and  $59.03\mu\text{m}^2$  at  $1580\text{nm}$  optical wavelength.

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