

# Çankaya University – ECE Department – ECE 474

2013 Spring Term

March 2013

**Experiment 5** : Finding  $\beta$ , beta,  $r_{\min}$  and  $r_{\max}$  in graded index fibres

**Experiment coded in MATLAB (with file name WKBcurves.m) is given on webpage of ECE 474.**

1. Copy the experiment file into the directory of your name.
2. Run the file, observe the OPs, do not record anything yet. Try to follow what is intended and what is happening
3. This experiment plots the graphs of radial component  $k_r$  over the cross section of the fibre in core and cladding regions. At the same time it marks and calculates the turning points, i.e.,  $r_{\min}$  and  $r_{\max}$  of ray trajectory. Finally it calculates  $\beta$  (beta), the propagation constant.
4. By using different settings for  $\nu$  and  $m$ , plot, check whether the numeric values for  $r_{\min}$  and  $r_{\max}$  read from the graph agree with those found from the roots of  $k_r$  expression.
5. For at least ten different values of  $\nu$  and  $m$ , plot graphs, record  $r_{\min}$  and  $r_{\max}$  values, examine the  $\beta$  (beta) values and by making reference to  $k_1$  and  $k_2$ , state what type of modes (rays) each set of  $\nu$  and  $m$  represent.
6. Record the outputs to print them in your experiment report.
7. Include your comments for the experiment