

Çankaya University – ECE Department – ECE 474

2012 Spring Term

08.05.2012

Experiment : Investigation of Gaussian beam size and radius of curvature in propagation

Experiment coded in MATLAB is given on course webpage, ece474.cankaya.edu.tr.
with file names of Beamsize.m and Focusingpram.m

1. Download the experiment files into your computer.
2. Run the file, observe the OPs. Try to follow what is intended and what is happening
3. Beamsize.m is intended to show you the variation of Gaussian beam beam size (α_r) in Focusingpram.m is intended to show you the variation of Gaussian beam focusing parameter (F_r), also called as radius of curvature against propagation distance (z), source size (α_s), focusing parameter on source plane (F_s) and wavelength of operation (λ). The definition of α_r is based on (G24) of Notes on free space propagation for ECE 474_Nisan 2012 and the definition of F_r is based on (G28) of the same notes.
4. Run both Beamsize.m and Focusingpram.m within a range of $z = 0 \rightarrow 5$ km at $\alpha_s = 1$ cm, 2 cm, 5 cm, 10 cm, $F_s = 1$ km, ∞ , -1 km, $\lambda = 0.85 \mu\text{m}$, $1.31 \mu\text{m}$, $1.55 \mu\text{m}$, $1.7 \mu\text{m}$ to get plots. Observe and record the plots. From these plots find and write the dependencies of α_r and F_r on z , α_s , F_s and λ .
5. In Beamsize.m, α_B , z_B , z_{R_1} , z_{R_2} are calculated and written out in work space. Confirm that these are in line with those measured on the plots. Additionally where appropriate calculate α_f , z_f , z_R . For this use the definitions given in Notes on free space propagation for ECE 474_Nisan 2012.
6. Include your general comments in the experiment report.