Contribution ID: **476**   Type: **Oral Presentation**

A transmitter-receiver model of the propagation of the second moments of a non-Gaussian non-spherical laser beam through an ABCD system.

Wednesday, 11 July 2012 11:35 (20 minutes)

Abstract content
   (Max 300 words)

A free-propagating laser beam can be completely defined if its beam size, divergence and space-angular moment at a plane are known. I present a model which is based on the idea that under these circumstances, once these parameters are known in one plane, say z =0, we can calculate the same parameters at a subsequent plane, z > 0 if the space between the two planes is described an ABCD matrix. I show that we can calculate the beam quality factor (M2), a parameter which does not depend on the ABCD elements. The resulting expression for M2 is based on the so-called, curvature removal method. I also show that, during translation, the so-called local parameters (which depend on z), i.e., the divergence, curvature and the Guoy shift, and what I am going to call the global parameters (which are independent of z), i.e., the waist position, waist size, Rayleigh range and far-field divergence, can all be calculated from the input parameters if the ABCD matrix elements are known. I then derive a few well-known expressions to confirm the model's validity.

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Session Classification: Photonics

Track Classification: Track C - Photonics