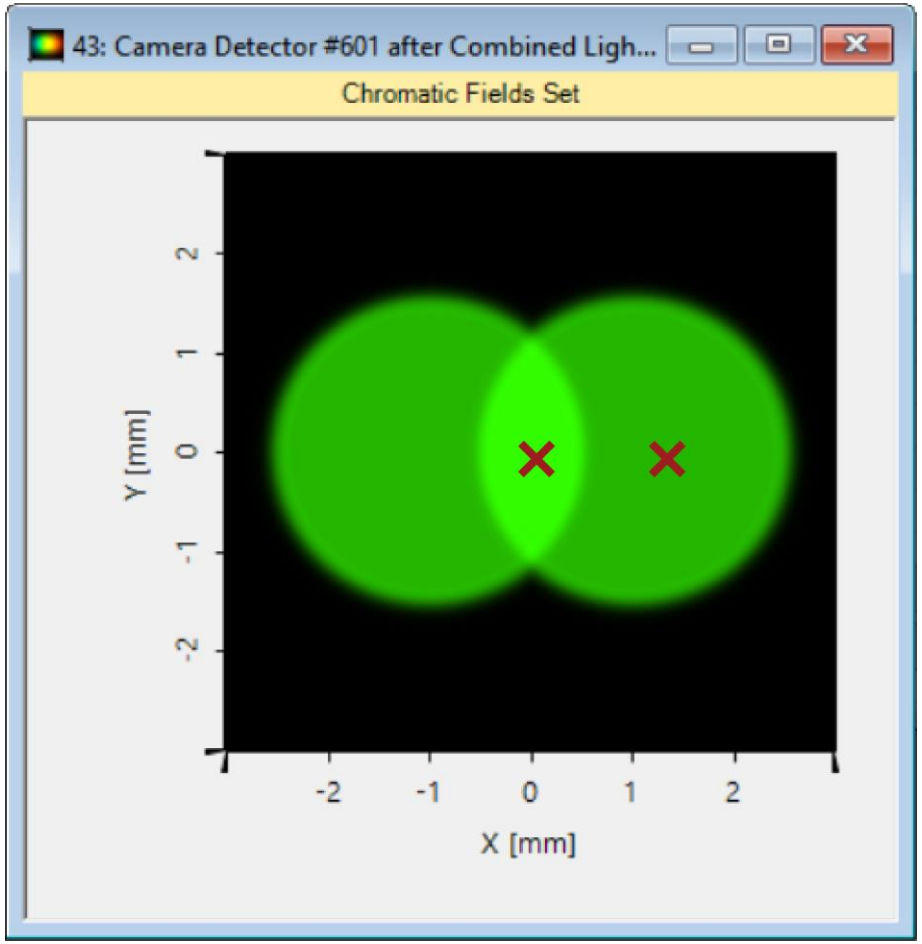
Programming a Degree of Coherence Detector

Abstract



The electromagnetic field on any plane, with arbitrary coherent property, can be decomposed into coherent and mutually uncorrelated modes. In VirtualLab Fusion, one can always access the fully vectorial electromagnetic fields, and by means of the Programmable Detector, one can calculate the degree of coherence on the detector plane according to its definition. This example shows the calculation of the complex degree of coherence for E_x and E_y respectively.

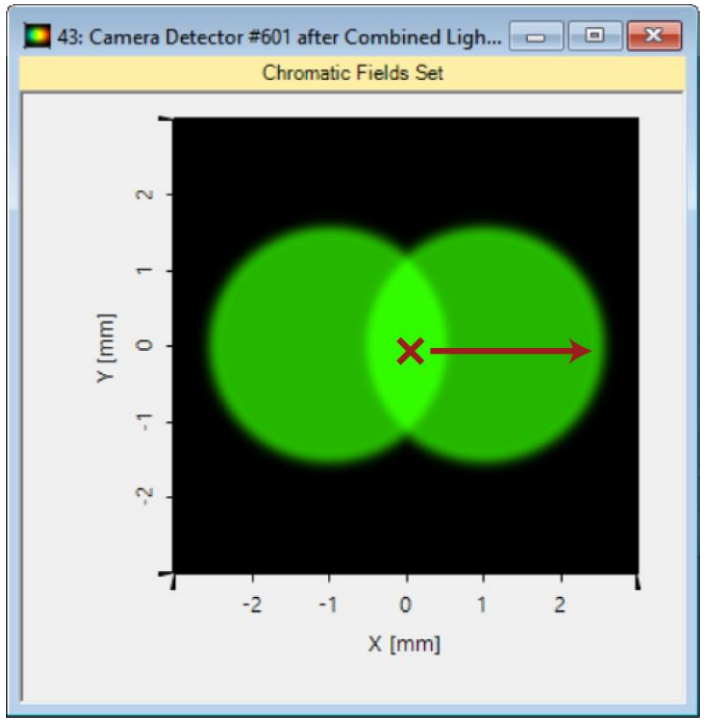
Task Description & Result

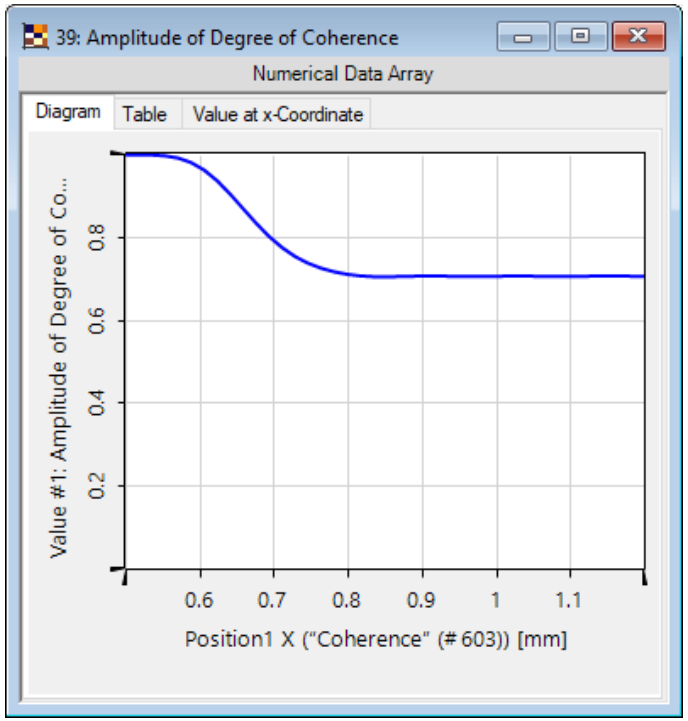
Task:
Calculate the complex degree of coherence of the field between two different positions. For $\boldsymbol{\rho}_1$=(0, 0) and $\boldsymbol{\rho}_2$=(x, 0).

The complex degree of coherence is given by:

$$\mu(\boldsymbol{\rho}_1, \boldsymbol{\rho}_2; \omega) = \frac{\sum_{n=1}^{N} V_n^*(\boldsymbol{\rho}_1) V_n(\boldsymbol{\rho}_2)}{\sqrt{(\sum_{n=1}^{N} |V_n(\boldsymbol{\rho}_1)|^2)(\sum_{n=1}^{N} |V_n(\boldsymbol{\rho}_2)|^2)}}$$

with V_n is the complex amplitude of either E_x or E_y of the nth mode. $\boldsymbol{\rho}_1$ and $\boldsymbol{\rho}_2$ are coordinates of two positions.





Document Information

title	Programming a Degree of Coherence Detector
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version	1.0
toolbox(es)	Starter Toolbox
VL version used for simulations	7.4.0.49
category	Feature Use Case
further reading	- How to Work with the Programmable Detector and Example (Minimum and Maximum Wavelengths) - Programming a Detector for Diffractive Optics Merit Functions Calculation