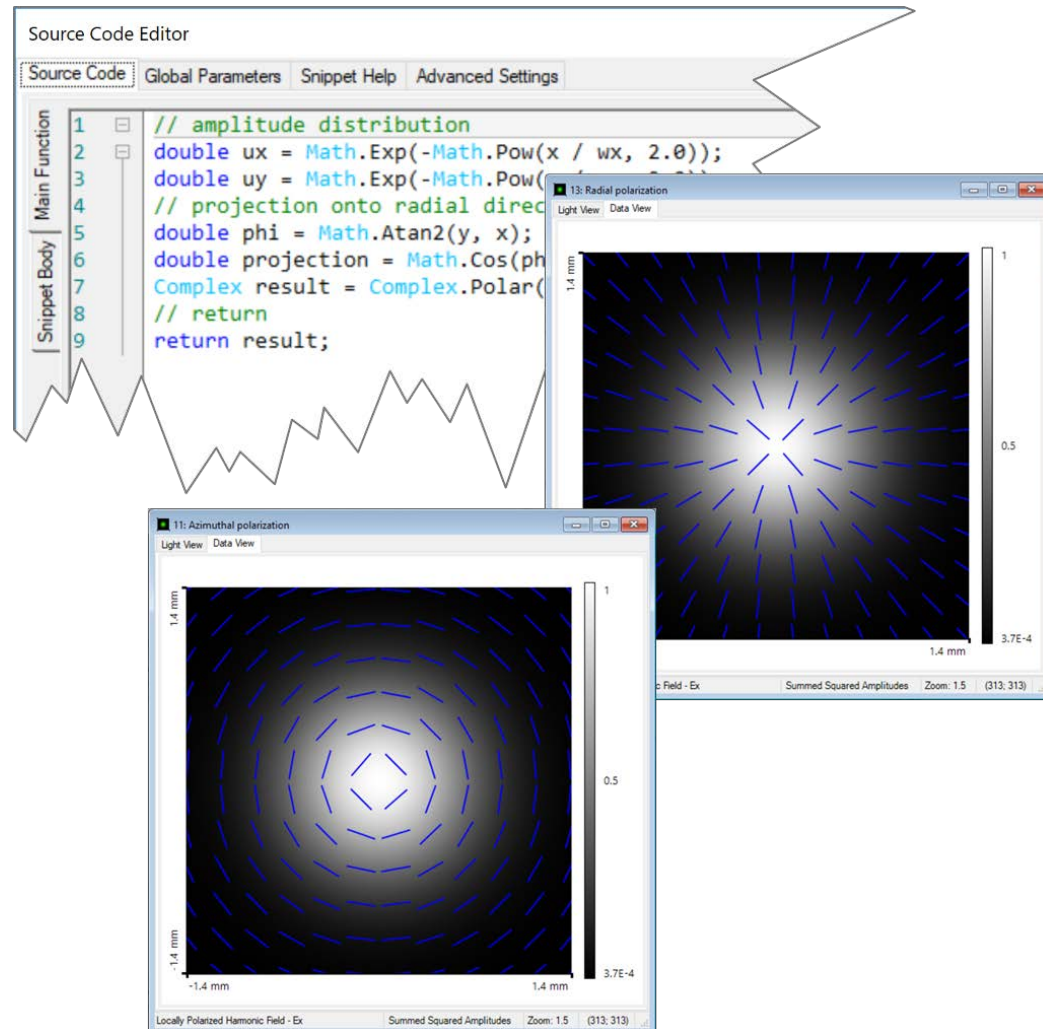


# Programming Radially & Azimuthally Polarized Sources

# Abstract



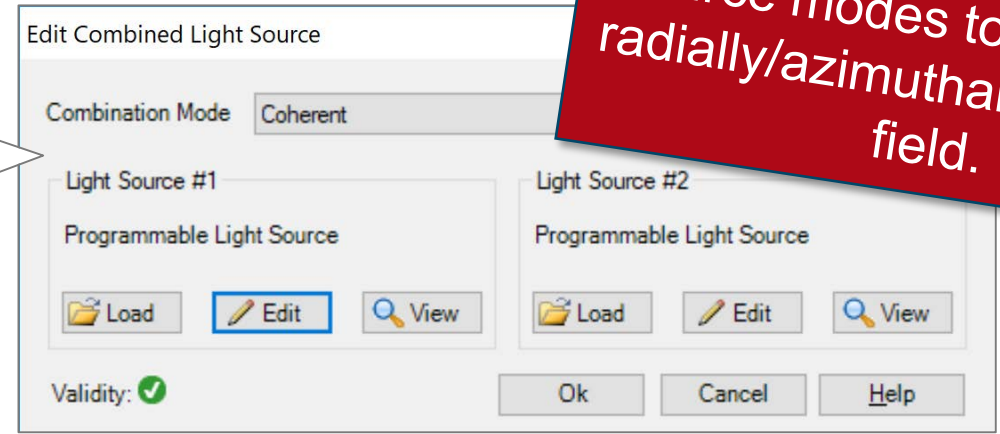
Polarization is one of the most characteristic properties of light, with much beyond the basic concept of global polarization, where light can only be linearly, circularly or elliptically polarized. We present here how to create in VirtualLab a radially and an azimuthally polarized source, illustrating in the process the programming of light sources and the potential of the Combined Light Source feature.

# Custom Radially & Azimuthally Polarized Light Sources

```

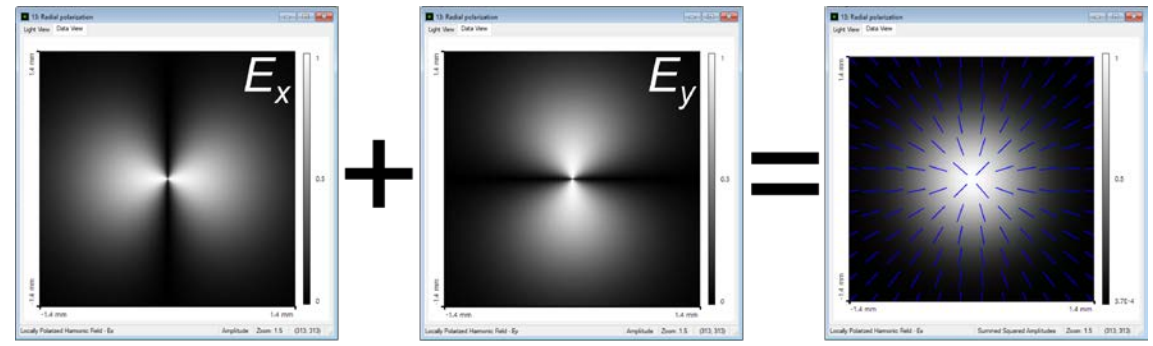
Source Code Editor
Source Code Global Parameters Snippet Help Advanced Settings
Main Function
1 // amplitude distribution
2 double ux = Math.Exp(-Math.Pow(x / wx, 2.0));
3 double uy = Math.Exp(-Math.Pow(y / wy, 2.0));
4 // projection onto radial direction
5 double phi = Math.Atan2(y, x);
6 double projection = Math.Cos(phi);
7 Complex result = Complex.Polar(ux * uy * projection, 0);
8 // return
9 return result;
Snippet Body
    
```

**Task:**  
Program the necessary source modes to generate a radially/azimuthally polarized field.



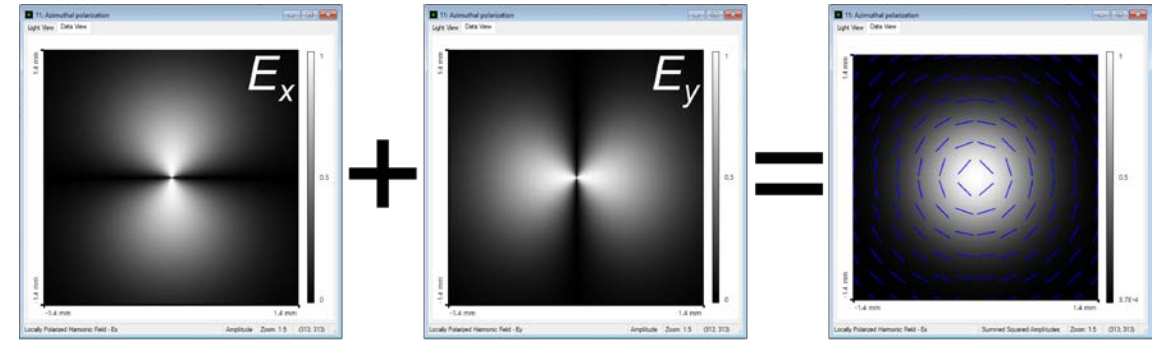
Radial polarization

$$\mathbf{E}_{\perp}(x, y) = U(x, y) [\cos \varphi \hat{e}_x + \sin \varphi \hat{e}_y]$$



Azimuthal polarization

$$\mathbf{E}_{\perp}(x, y) = U(x, y) [-\sin \varphi \hat{e}_x + \cos \varphi \hat{e}_y]$$



# Document Information

title	Programming Radially & Azimuthally Polarized Sources
document code	CZT.0105
version	1.0
toolbox(es)	Starter Toolbox
VL version used for simulations	7.4.0.49
category	Feature Use Case
further reading	<ul style="list-style-type: none"><li>- <a href="#"><u>Customizable Help for Programmable Elements</u></a></li><li>- <a href="#"><u>Programmable Light Source, Function, Interface and Medium</u></a></li><li>- <a href="#"><u>How to Work with the Programmable Light Source and Example (Gaussian Beam)</u></a></li></ul>