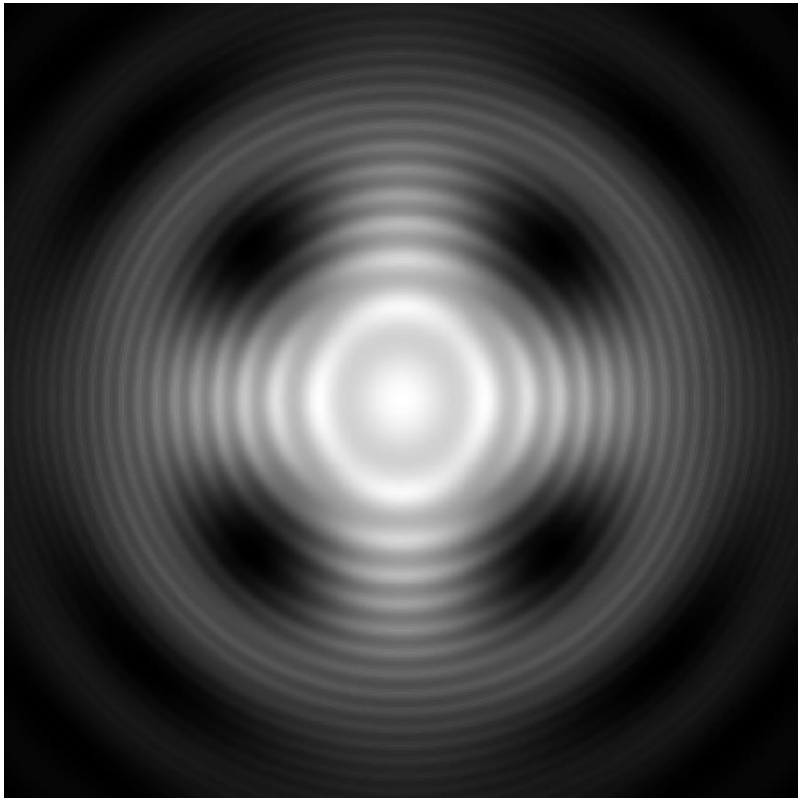
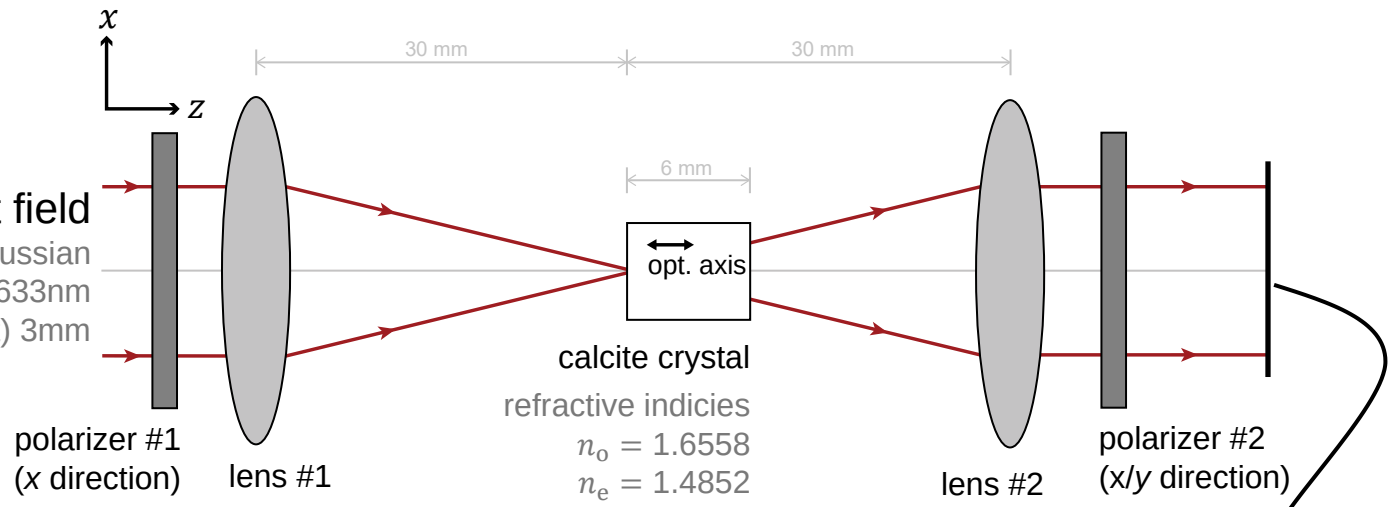
Polarization Conversion in Uniaxial Crystals

Abstract



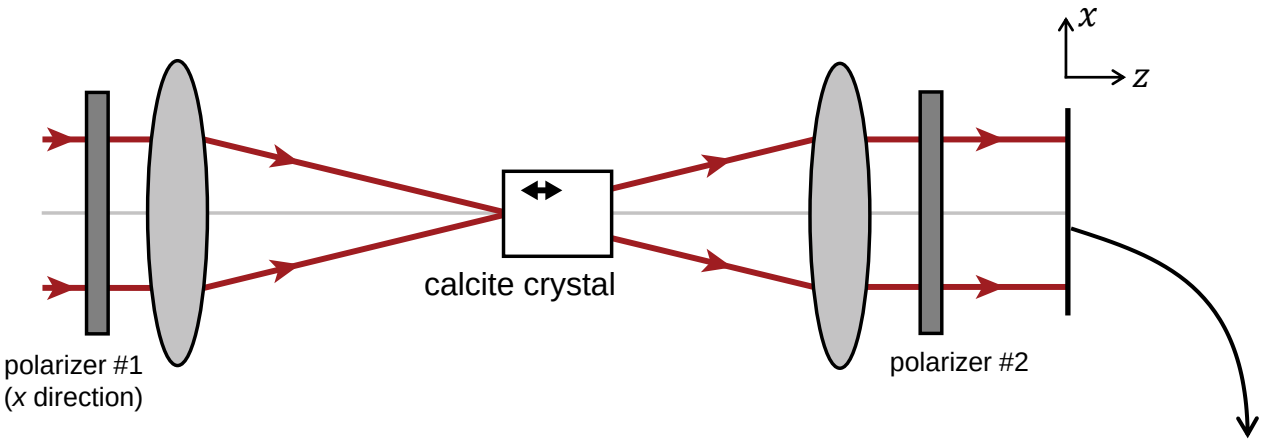
When a linearly polarized beam is focused and then propagated through a uniaxial crystal, even when along the optic axis, complicated conversions may take place between different polarization components. Such an effect can be utilized for e.g. generation of optical vortices. Taking calcite crystal as an example, the conversion of polarization in uniaxial crystal is demonstrated in VirtualLab. The optical vortices generated within the process is visualized.

Modeling Task

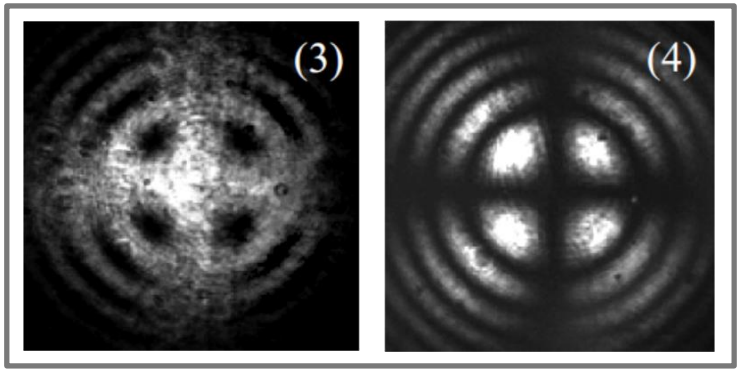


What is the field behind the second polarizer, when it is either along *x* or *y* direction?

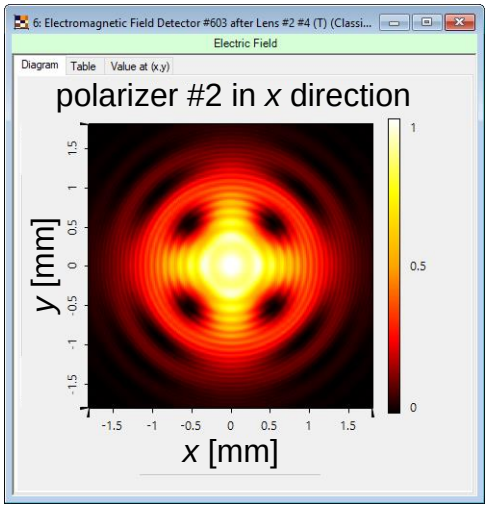
Results

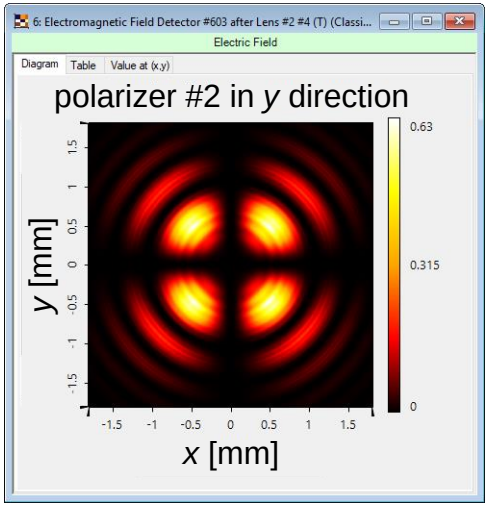


Physical-optics simulation of complete system includes birefringence and interference effects.

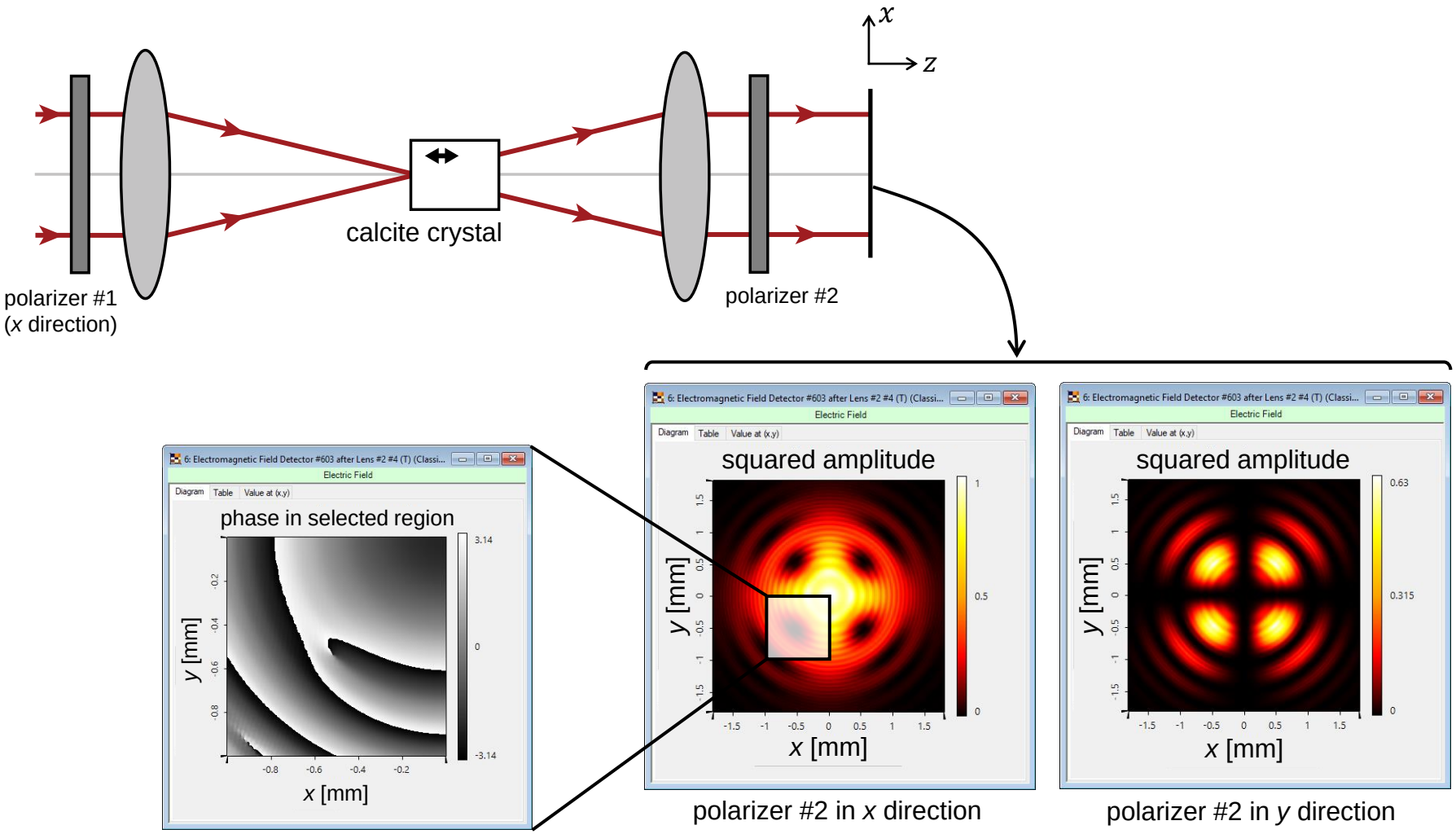


Experimental measurements from Y. Izdebskaya *et al.*, Opt. Express **17**, 18196-18208 (2009)





Results


x
z
calcite crystal
polarizer #1
(x direction)
polarizer #2
6: Electromagnetic Field Detector #603 after Lens #2 #4 (T) (Classi...
Electric Field
Diagram
Table
Value at (x,y)
phase in selected region
3.14
0
-3.14
y [mm]
x [mm]
squared amplitude
1
0.5
0
0.63
0.315
polarizer #2 in x direction
polarizer #2 in y direction

Document Information

title	Polarization Conversion in Uniaxial Crystals
version	1.0
VL version used for simulations	7.0.3.4
category	Application Use Case