LightTrans' Talks at SPIE Optics & Photonics 2020

Insights Into Physical Optics With Virtuallab Fusion for Optics Education

Optics Education and Outreach VI – Session 4: Formal education
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Due to the rapid development of the modern optics industry, physical optics education is already an indispensable part in optics education, because of the fact that more and more optical devices are designed, and naturally, are working based on physical-optics principles. That includes various effects and phenomena, like diffraction, interference, coherence, scattering, polarization, and so on. Such effects and phenomena, although being covered in certain textbooks, and sometimes also demonstrated in experimental manner, they still turn out to be difficult to fully understand. One possible cause for such difficulties is the disconnection between the purely theoretical blackboard derivation and the completely practical laboratory observation. One way to overcome such difficulties, in our opinion, is to employ VirtualLab Fusion – physical optics software – as a bridge connecting both sides. As a fully physical-optics-based software, light is represented as vectorial electromagnetic fields in VirtualLab Fusion and it provides an easy access to the visualization and analysis of the electromagnetic fields, leading to a convenient understanding of the nature of light, without loss of any preciseness. With the help of VirtualLab Fusion, we will demonstrate several classical physical optics effects, for example, diffraction from slits, Talbot effect, Arago spot (Poisson's spot), Michelson/Mach-Zehnder/Young's interferometers, Gouy phase shift, Goos-Hänchen shift, and so on. In addition, we will also show examples like grating diffraction, guided modes in fibers, femtosecond pulse propagation, and related application in modern optics industry. In this manner, we emphasize on both solid fundamentals and real-world applications.