ABSTRACT

TITLE:	An Experimental and Modeled Comparison of Diffraction in Imaging Systems
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ABSTRACT: The resolution limit of imaging systems is ultimately limited by diffraction. However, diffraction is often neglected in the analysis and design of both front and back illumination imaging systems in favor of the simpler ray tracing model. In many systems, paraxial optics provides a reasonable model for the design of systems with high resolution. This is certainly true for the majority of front-illuminated imaging systems; however, in back illuminated (shadowgraphic) imaging systems resolution is very strongly affected by diffraction. We present a detailed experimental comparison of imaging resolution differences between front and back illuminated imaging systems for non-scattering and scattering environments. Additionally, modeling results of both systems are compared with the experimental results and classical optical theory. Preliminary results and calculations show that physical optics creates a stronger effect on resolution in front illuminated systems in either scattering or non-scattering environments despite original predictions.