TPF Review
Pupil Mapping (aka PIAA)
Sensitivity Analysis

Robert J. Vanderbei

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JPL/Cal Tech

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http://www.princeton.edu/∼rvdb

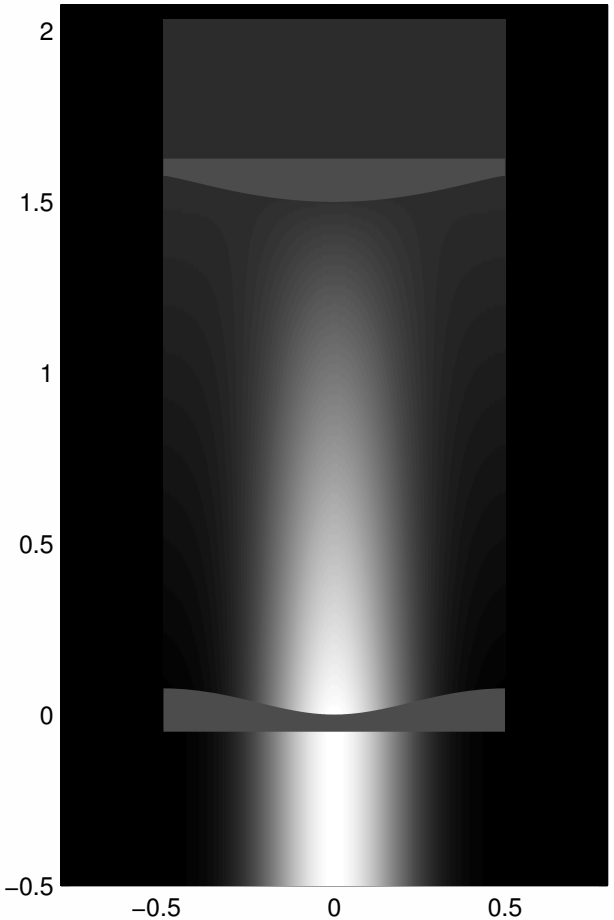
- **Linear unitary operator defining a coronagraph depends on λ.**
- **Coronagraphs for which λ dependence is small (just scaling) are preferred.**
- **Conjecture: "Ideal" PIAA is optimal among "achromatic" coronagraphs.**
- **The linear unitary operator depends on the optical model: Fresnel, Huygen's wavelets, Rayleigh-Sommerfeld, better-than-Fresnel, vector vs. scalar propagation, etc.**
- **"Real" PIAA is more chromatic than "ideal" PIAA.**
- **Hybrid apodized-PIAA design mitigates chromatic effects.**
- **Remaining issue: can the complicated real system be manufactured to theoretical specs.**

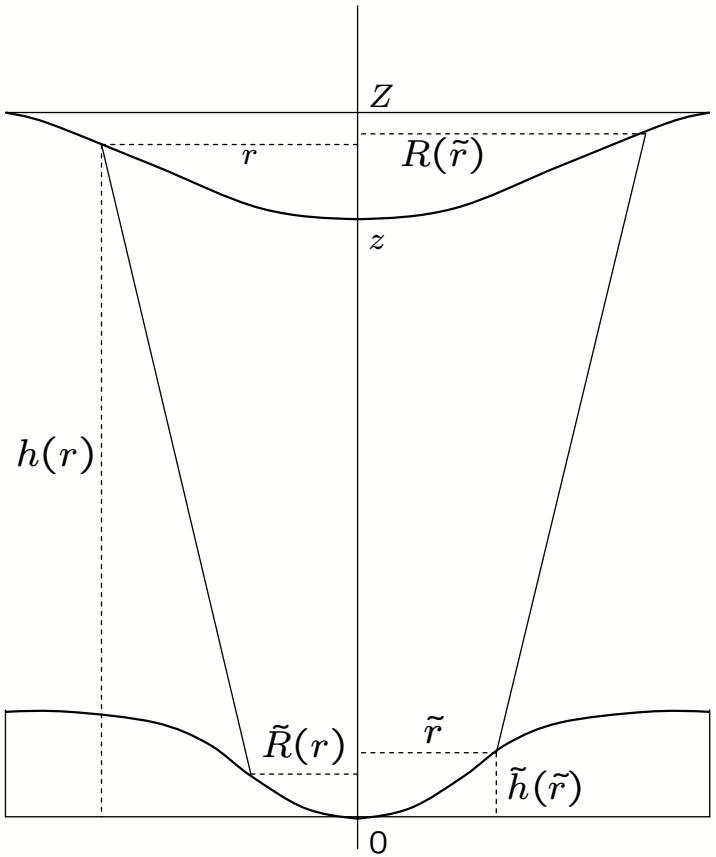
Reference:

Diffraction-Based Sensitivity Analysis of Apodized Pupil Mapping Systems, **Astrophysical Journal**, 2006. To appear.

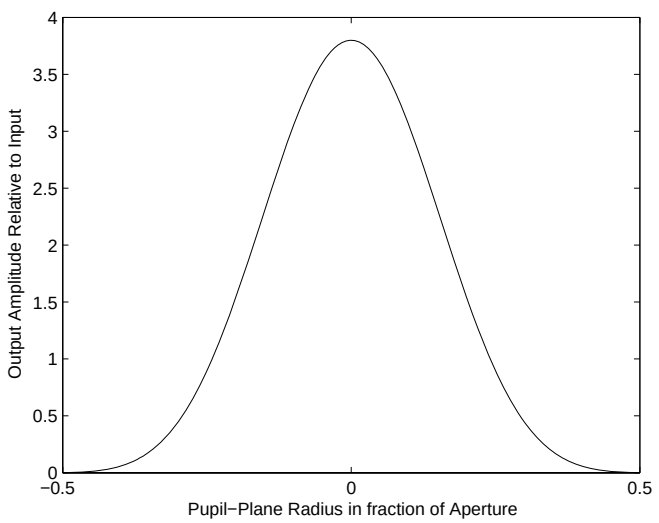
http://orfe.princeton.edu/~rvdb/tex/piaaSensitivity/ms.pdf

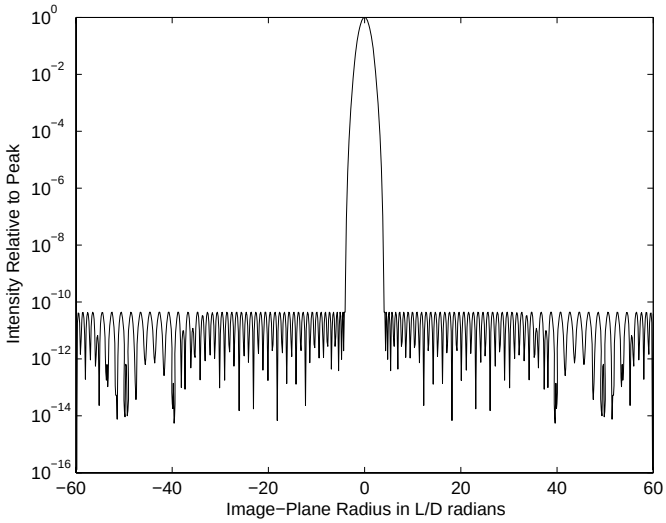
The Pupil-Mapping Concept



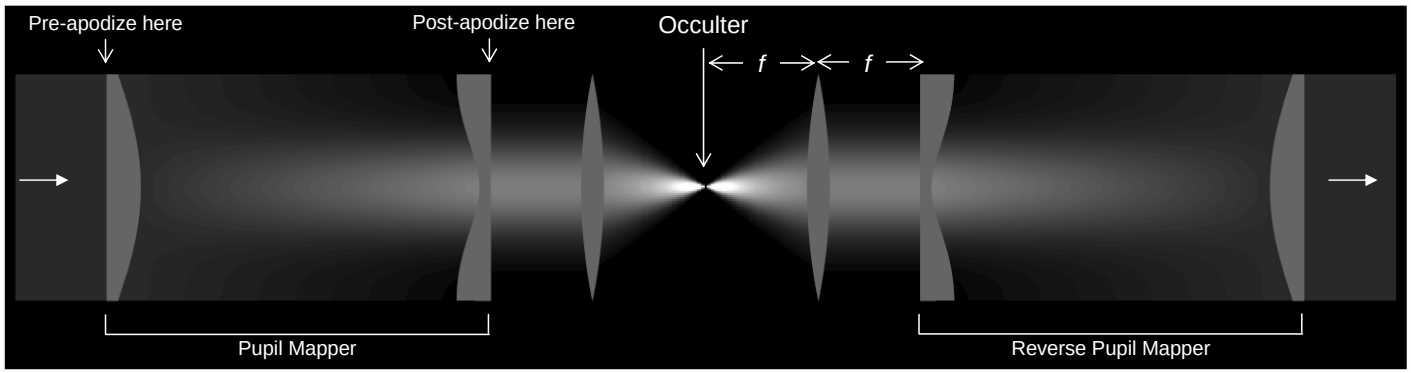


High-Contrast Amplitude Profile

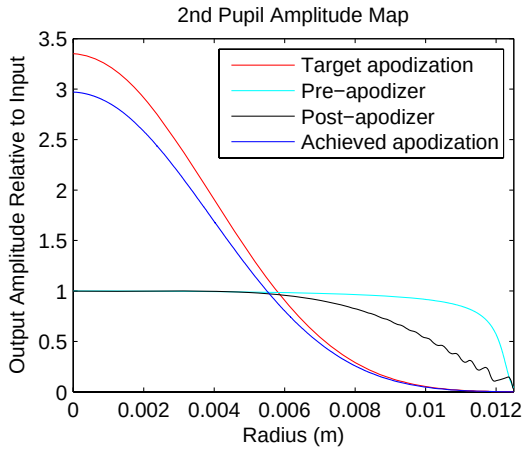


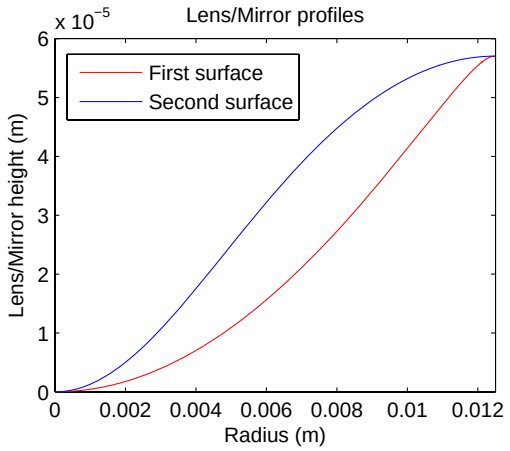


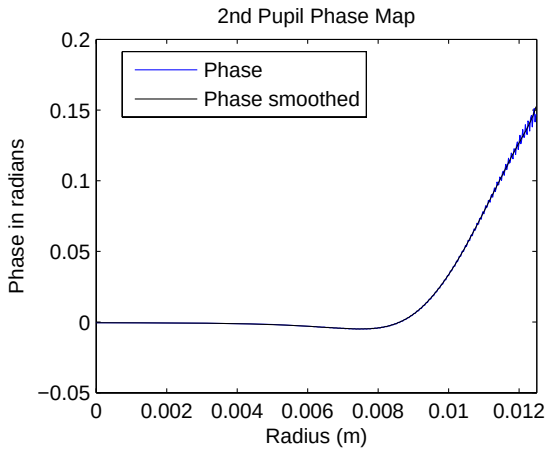
Full Pupil-Mapping System

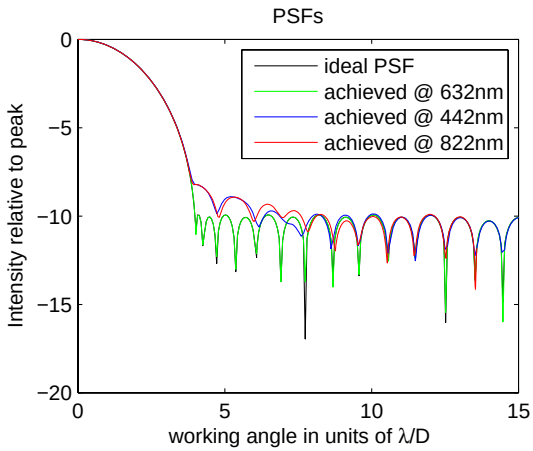


Diffraction Analysis of Apodized Pupil-Mapping

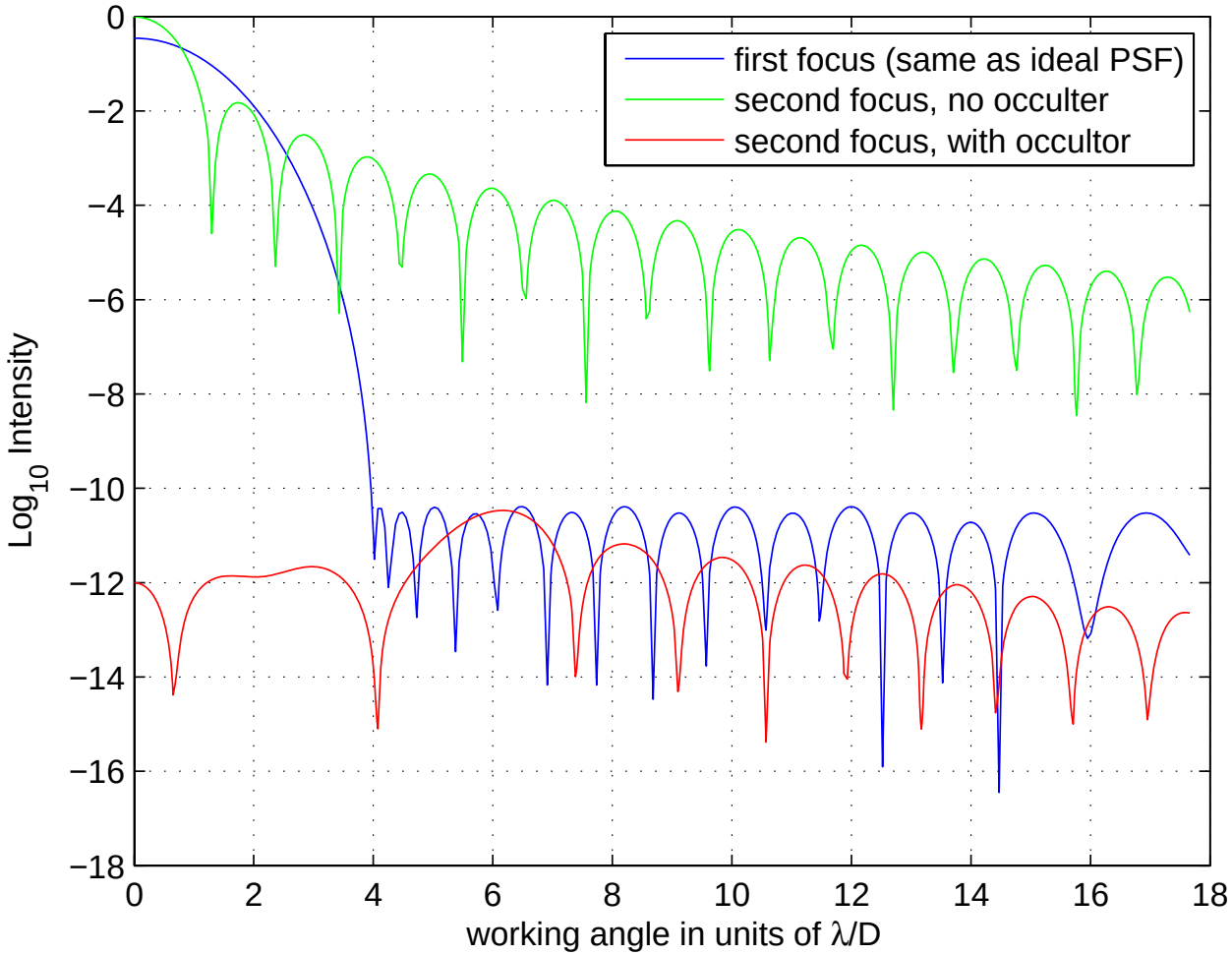




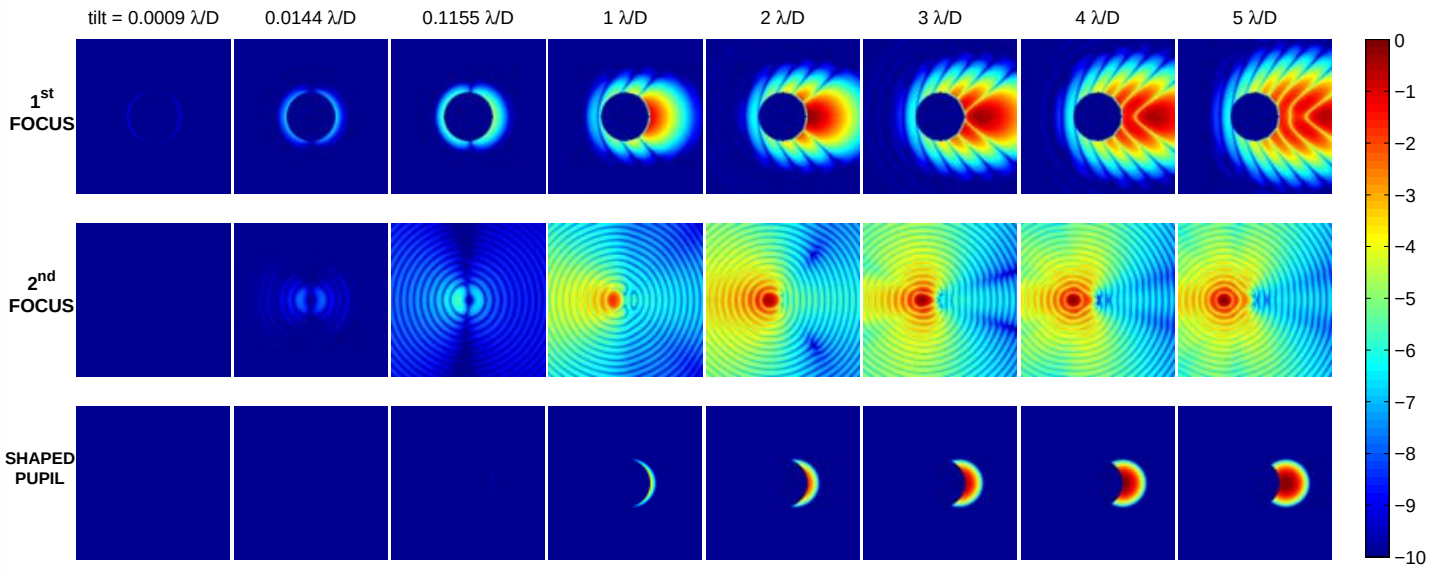




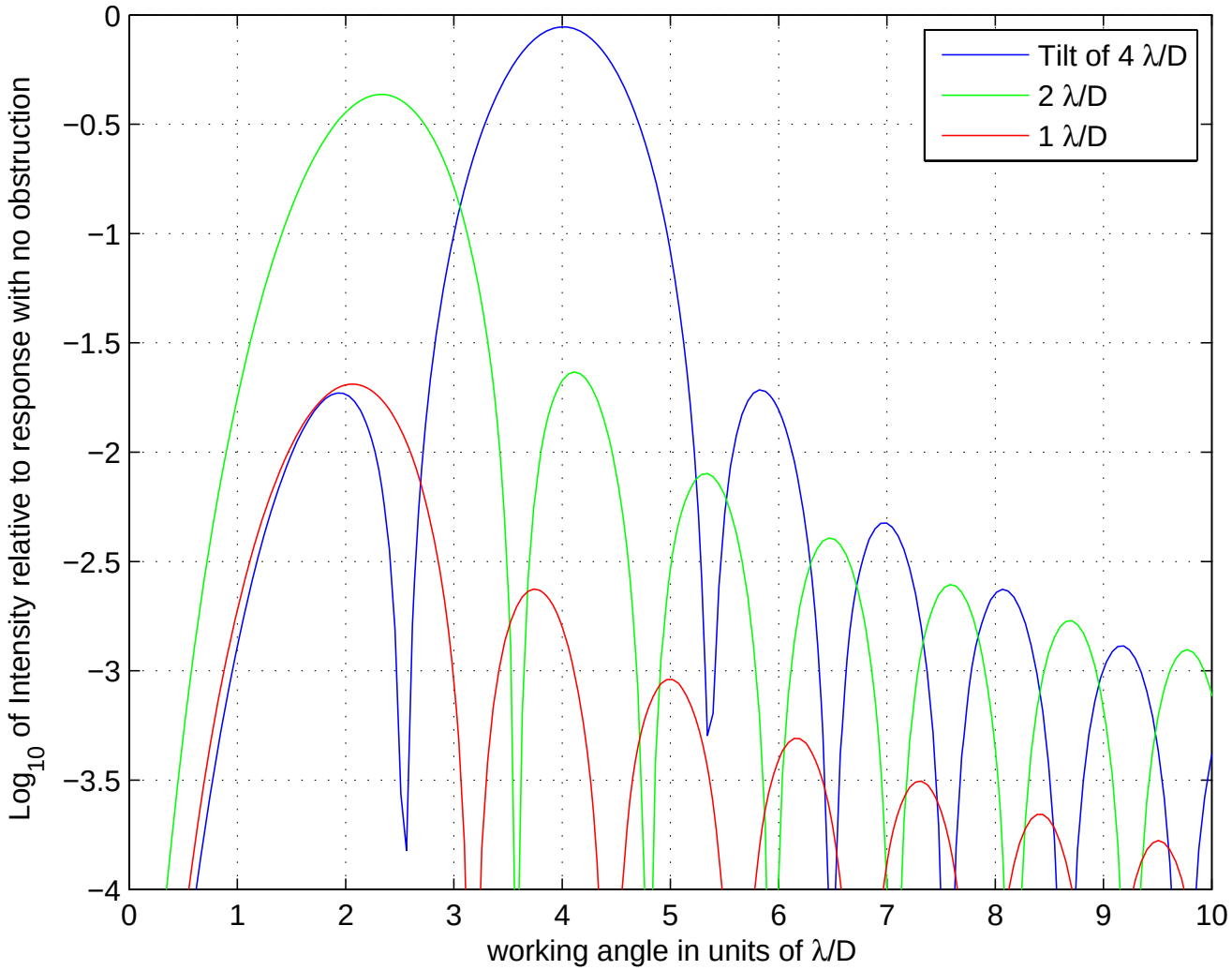
On-Axis PSF at 1st and 2nd Focus



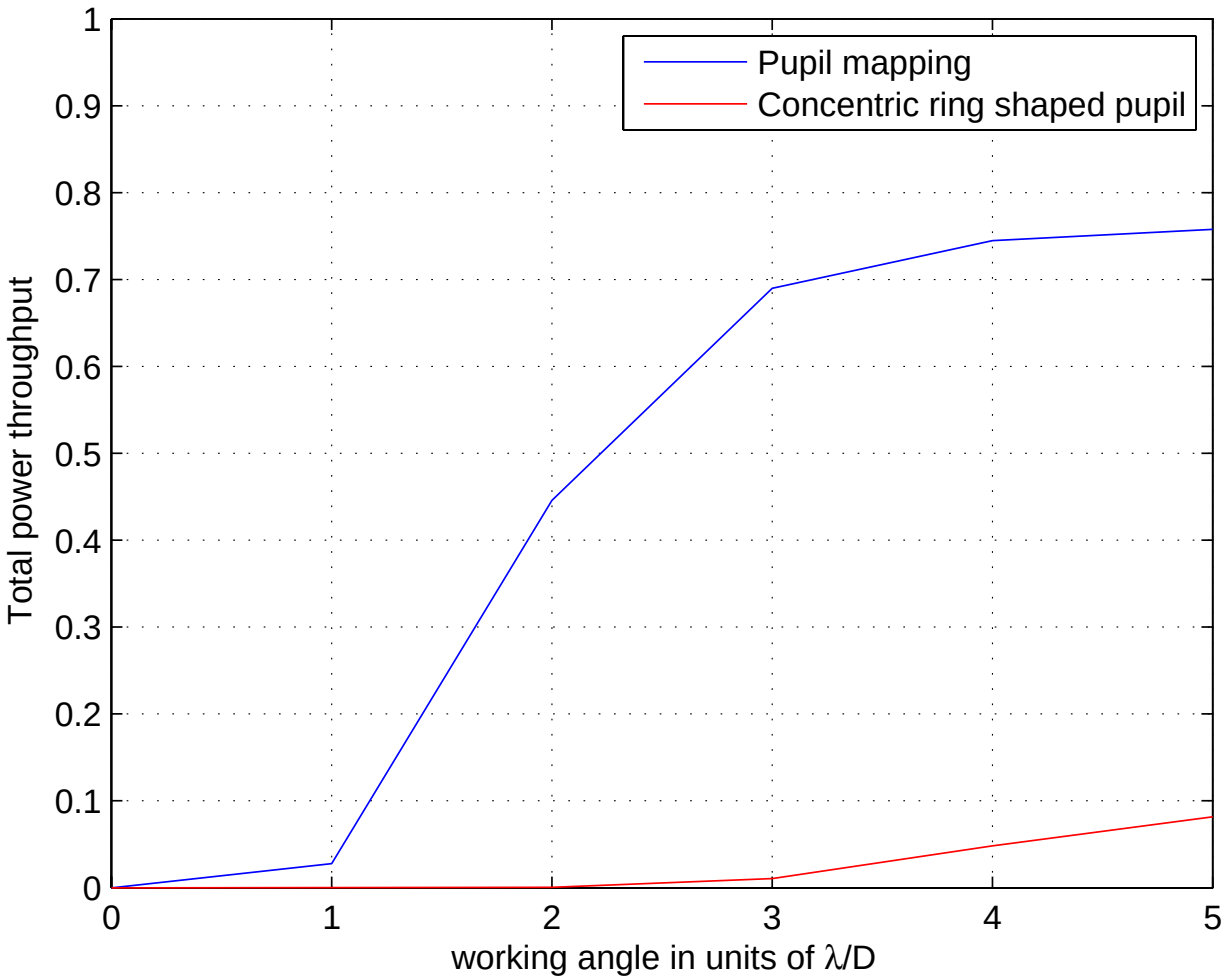
Off-Axis PSFs



Cross-Sectional Plot

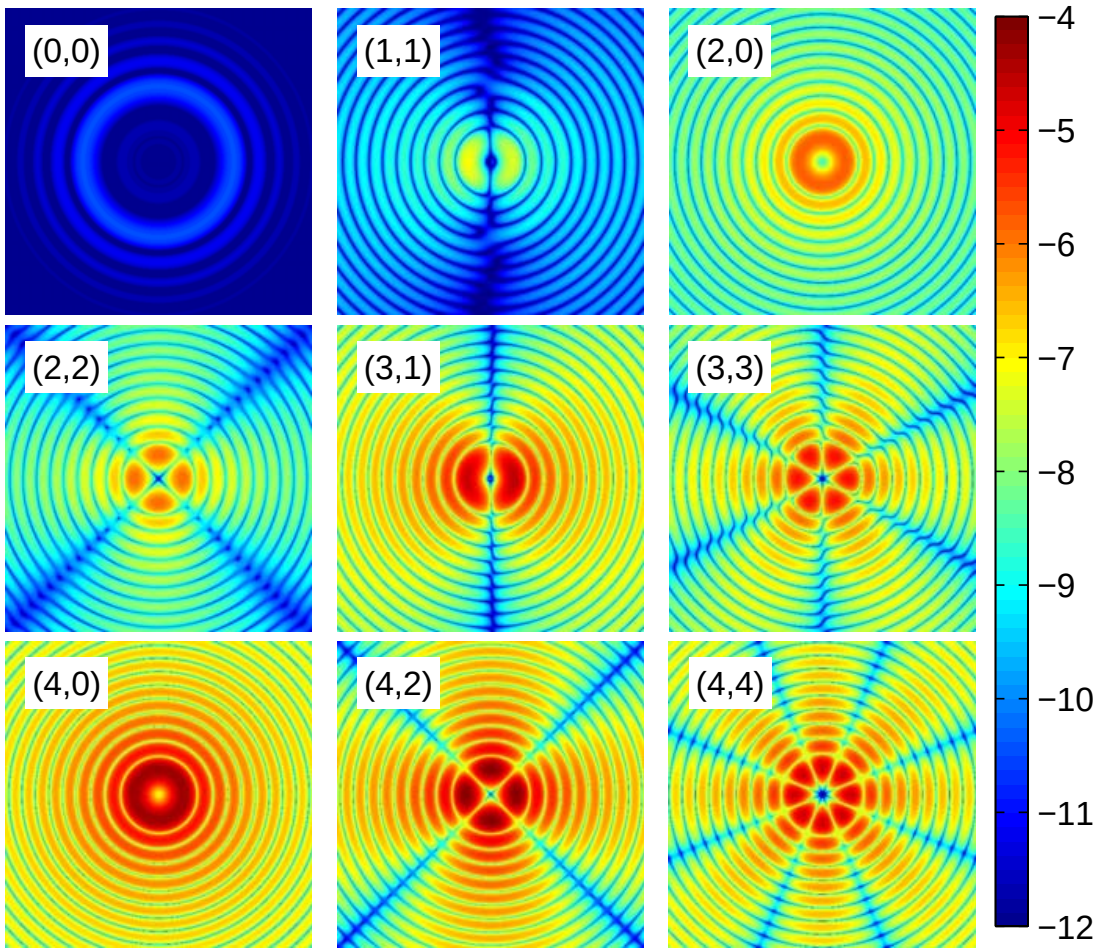


Throughput vs. Angle



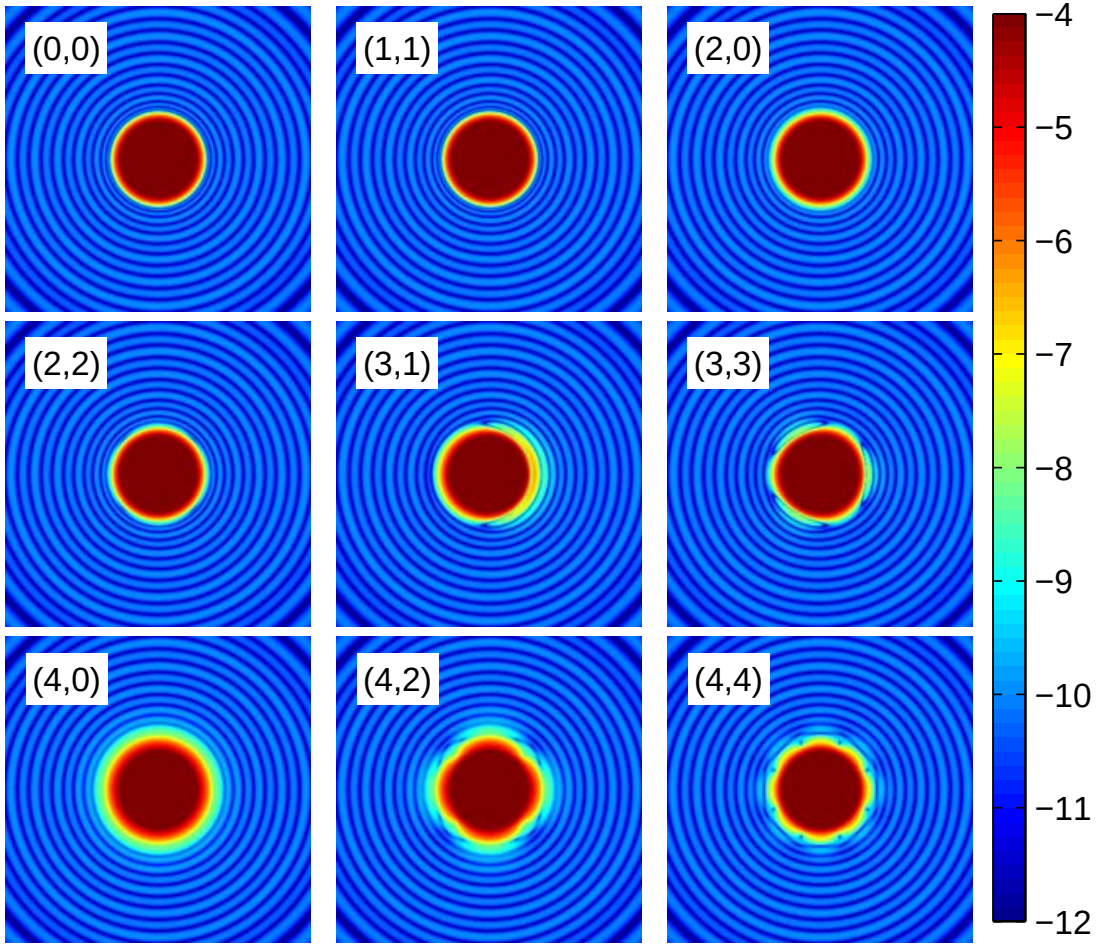
Sensitivity to Zernikes

Pupil Mapping



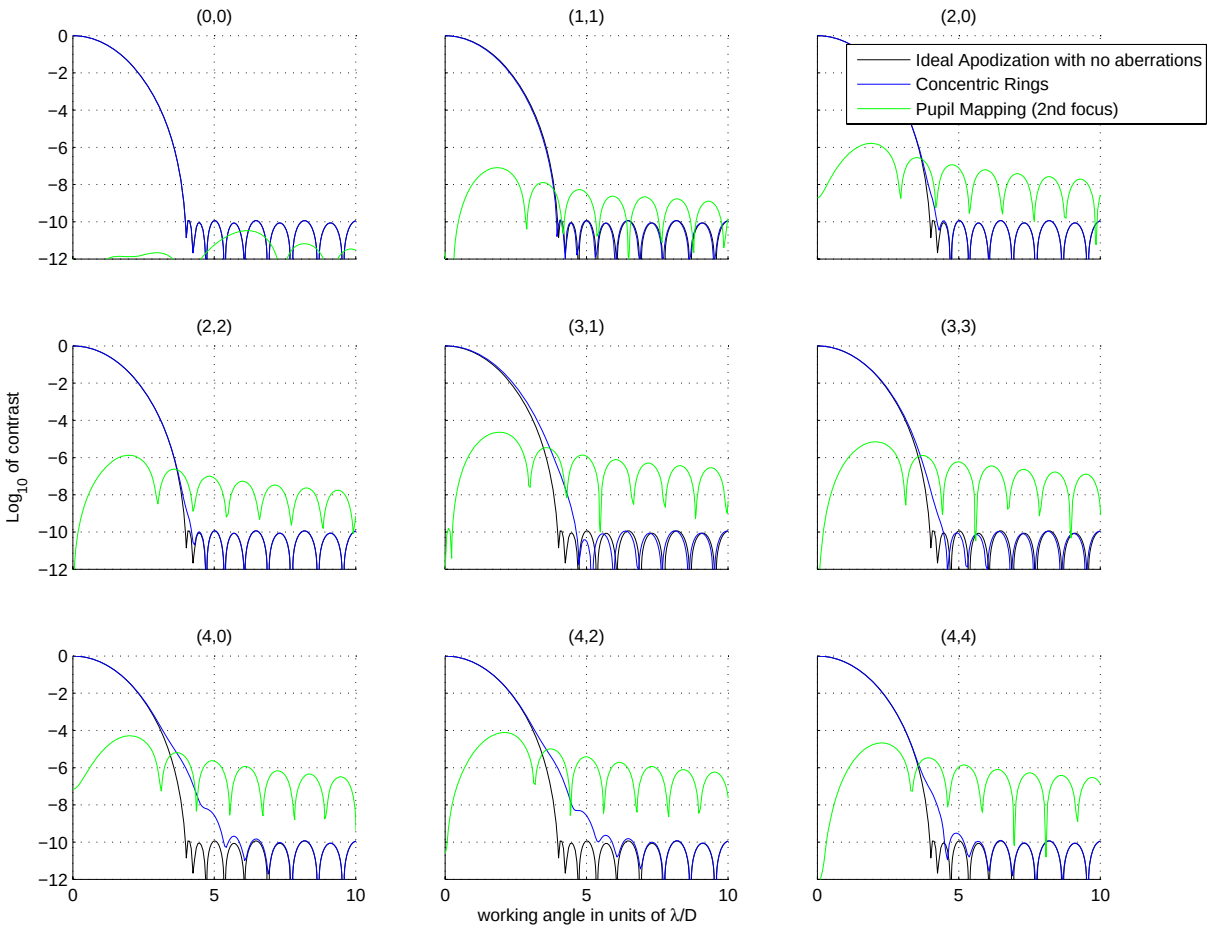
Sensitivity to Zernikes

Concentric Rings



Sensitivity to Zernikes

Radial Profiles



Shaklan Plots