Deformable mirror characterization for efficient fiber coupling

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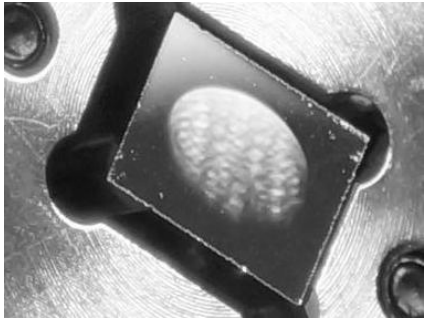
Laser Display and Lighting Conference 2025
Dublin, Ireland.

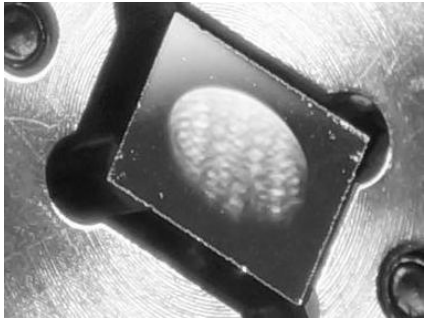
2025-06-18

DYOPTYKA technology



Randomly-distributed DM surface deformations.

DYOPTYKA technology



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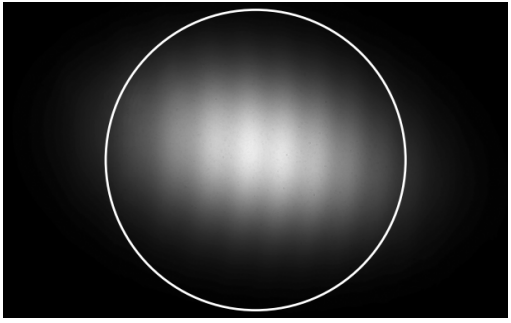

Randomized divergence with 3 deg *angular extent.*

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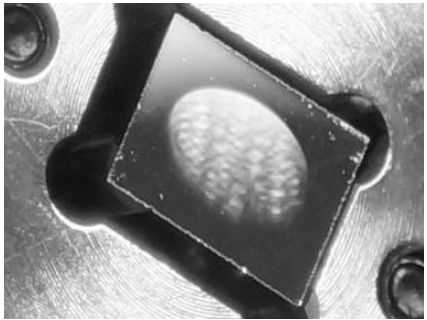
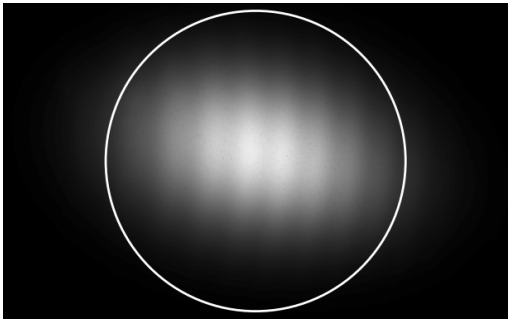


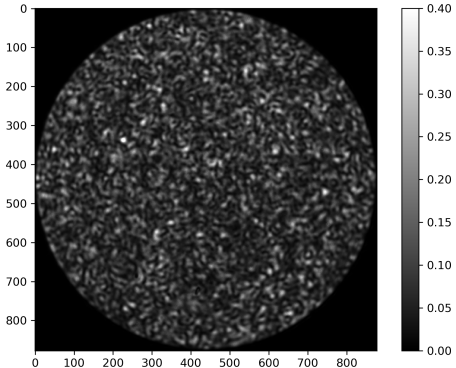
Randomly-distributed DM surface deformations.



Randomized divergence with 3 deg *angular extent.*

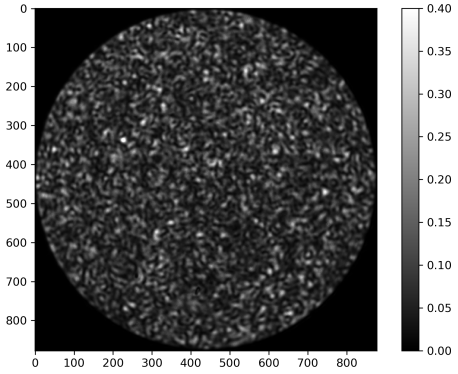
Typical frequency $\geq 1\,\mathrm{MHz}$*; area* $3\,\mathrm{mm}\times 4.5\,\mathrm{mm}$*; reflectance* $\geq 96\%$*; damage* $\geq 1\,\mathrm{W\,mm^{-2}}$.

Circular core exit face, ⌀200 µm, 0.22 N.A, 20 µs exposure.



DM inactive, $C_S^0 = 59.2\%$.

Circular core exit face, ⌀200 µm, 0.22 N.A, 20 µs exposure.



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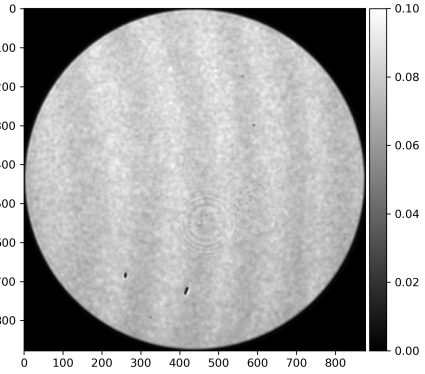
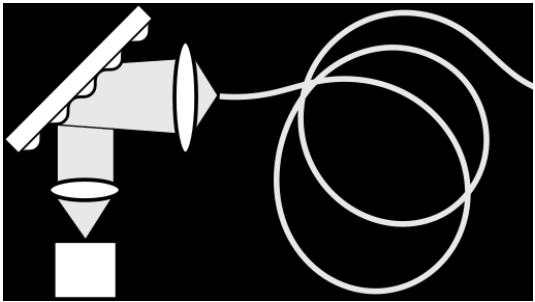


DM active, $C_S^{20} = 5.6\%$.

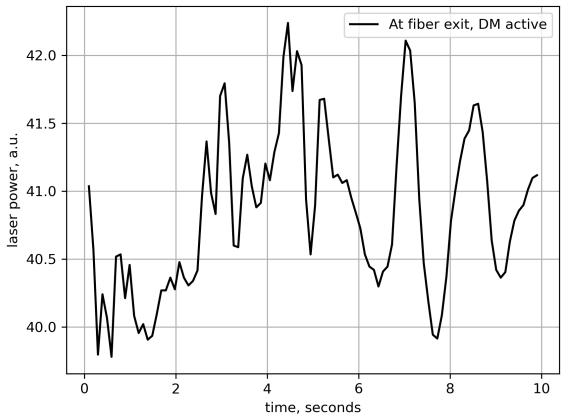
Fiber coupling



Angular magnification: $0.22 / \sin 1.5\,\text{deg} \approx 8$

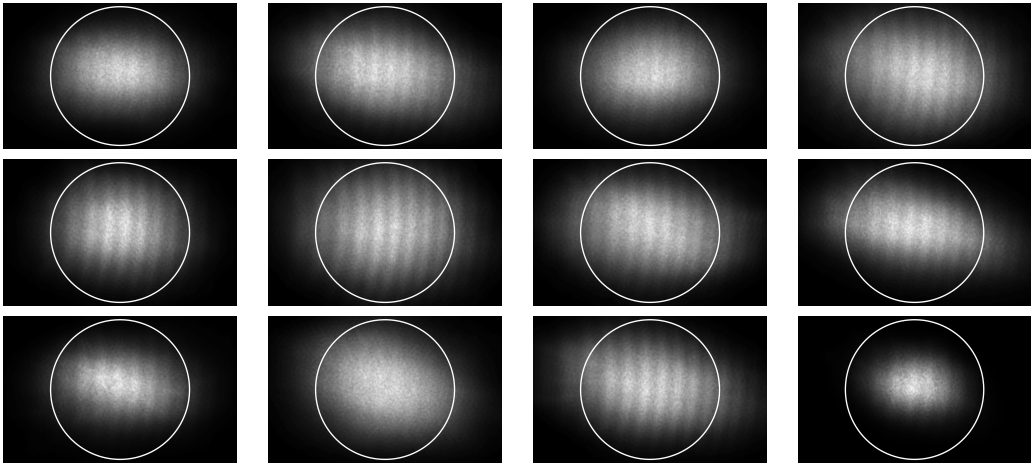
$\approx$ spot size demagnification: $\varnothing 1.6\,\text{mm} / \varnothing 200\,\mu\text{m}$

Power variation between 20 µs exposures



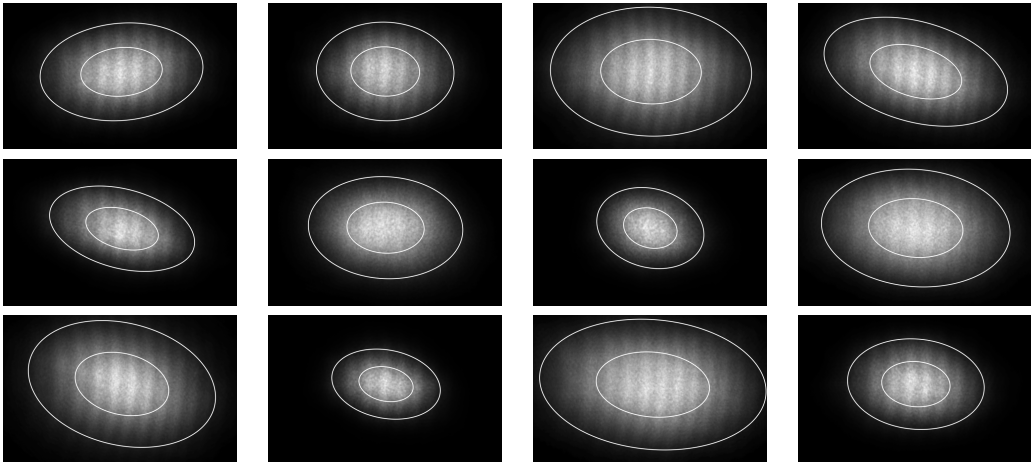
Not evident with longer exposures, e.g. > 1 ms.

Randomized divergence within 20 µs



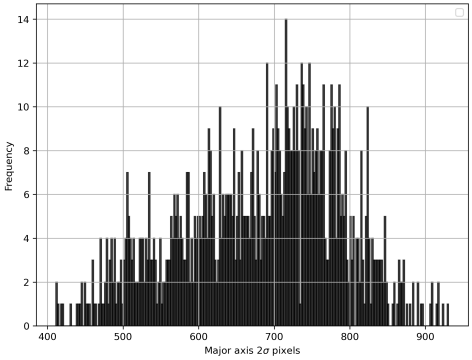
Divergence angle sometimes exceeds design N.A. of coupling optics.

Gaussian fit to randomized divergence



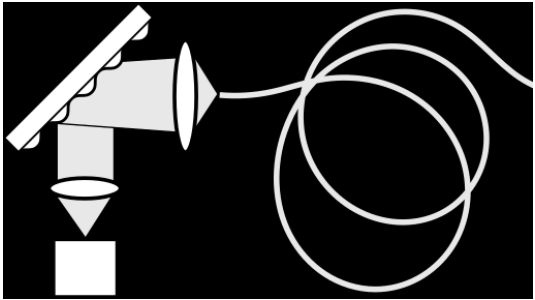
Contours plotted at 1σ and 2σ distances.

Frequency of 2σ distance



Maximum $\approx 4/3$ *mean.*

Conclusions



For power stability and efficient fiber coupling,

$$\text{Angular magnification:} \quad 0.22/\sin 2\,\text{deg} \approx 6.3$$
$$\approx \text{spot size demagnification:} \quad \varnothing 1.26\,\text{mm}/\varnothing 200\,\mu\text{m}$$

Thank You!

Please contact me to discuss:

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