Small mirror features large stroke

ALPAO

The Hi-Speed DM37 deformable mirror from Alpao (Biviers, France) has a clear aperture of 7.5 mm but a large stroke of more than ±35 μm for astigmatism and focus wavefront correction, nonlinearity errors of <3% and a settling time of 1 ms (±5%). The company says this is the first time such large aberrations can be corrected by such a small device. Stroke is >1.8 μm in waffle mode, or >20 μm when all actuators are pushing or pulling in the same direction with a 3 × 3 pattern. Quick stabilization allows operation without wavefront sensors by using iterative algorithms. The 37 actuators are arranged in a square grid with 1.5 mm between them. The error in mirror surface quality is <10 nm root mean square (r.m.s.). Wavefront tip–tilt stroke (peak-to-valley) is more than 60 μm. Operating temperature range is 15–30 °C. The mirror is protected with a silver coating. The device is controlled by a PCI input/output board and comes with drivers for C/C++, Matlab and Labview. Drive electronics control the current rather than the voltage, giving more precise control.

www.alpao.fr

Wavefront sensor gives diverse characterization

The HASO R-Flex from Imagine Optic (Orsay, France) is a compact, auto-illuminated wavefront sensor that comes in a variety of configurations, allowing users to characterize large concave mirrors, lenses on-axis or in the field, complex optical systems, beam expanders or external sources. It is based on a HASO Shack–Hartmann wavefront sensor, and is available in 32 × 40, 76 × 100 or 128 × 128 actuator configurations. The device also includes a collimator, a focusing objective and a laser diode. It provides a standard measurement accuracy of $\lambda/100$ r.m.s., or $\lambda/200$ in double-pass configurations. A variety of standard focusing modules feature *f* numbers from *f*/2 to *f*/30, and custom-made modules are also available. Pupil sizes are 4.9 × 6.1 mm^2 for the R-Flex 32, 8.7 × 11.4 mm^2 for the R-Flex 76, and 14.6 × 14.6 mm^2 for the R-Flex 128. The exit beam is divergent and thus allows users to set the focal spot at any point, which is useful for characterizing large optical components or complex systems. Users can measure and analyse surface defects by setting the spot at the centre of a concave mirror. Wavefront measurement and analysis software displays aberrations in real time so that users can immediately see the effects of positioning or alignment adjustments. All three versions of the device are small enough to easily mount onto a translation stage, allowing samples to be measured on-axis or at any point in the field.

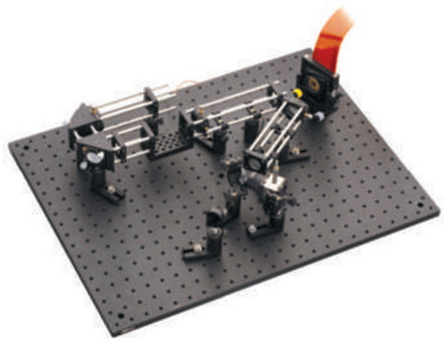
www.imagine-optic.com

Deformable mirror for tabletop applications

The latest deformable mirror from Edmund Optics (Barrington, New Jersey, USA) consists of 32 radially arranged actuators that control the shape of a 5-μm-thick nitrocellulose mirror membrane. The mirror features an active (deformable) area of 11 mm in diameter, and the actuators have a maximum stroke distance of 10 μm. The company says the mirror is suited to both tabletop applications and to integration by original equipment manufacturers. The surface quality of the mirror is ≤50 nm r.m.s. The clear aperture is 19 mm and the focal length is ≤2,200 mm. The device has a silver coating and 32 electrodes, operates at 250 V and is RoHS-compliant. The mirror is compatible with 1-inch Techspec kinematic circular optical mounts. It can be used with a 64-channel embedded high-voltage driver with a voltage of 250 V and an output current of 30 μA per channel. The driver has two USB 2.0 ports and one Gigabit Ethernet port, 512 MB of memory and operates on an Intel 1.1 GHz Atom processor. It has software libraries in C++, Java, Matlab and Labview. The mirrors are also contained within an embedded adaptive optics system that comes with 32-channel drive electronics and a software package that integrates a pre-tested influence matrix specific to the mirror.

www.edmundoptics.com

Adaptive kit offers easy solution



THORLABS

The AOK2 series of mini adaptive optics kits from Thorlabs (Newton, New Jersey, USA) and Boston Micromachines (Cambridge, Massachusetts, USA) are designed for quick integration into research systems to provide users with easy access to real-time, high-precision wavefront measurement and correction techniques. The kit contains all imaging optics and their associated mounting hardware, a Shack–Hartmann wavefront sensor from Thorlabs, and a 32-actuator mini deformable mirror from Boston Micromachines based on microelectromechanical systems technology and coated with either gold or aluminium. Stand-alone control software compatible with Microsoft Windows XP is also included, along with a low-level support library to allow users to develop their own applications. The aluminium-coated version covers the 400–1,100 nm wavelength range, and the gold-coated mirrors cover 600–1,100 nm. The system provides a closed-loop frame rate of 8 Hz. Each of the 32 actuators in a 6 × 6 array with four inactive corner actuators offers a stroke of 3.5 μm and can be individually controlled. Electrostatic actuation allows deformation of the mirrors without the hysteresis issues common in piezoelectric mirrors. A 6° protective wedge in front of the mirror has a broadband antireflective coating covering the wavelength range of 400–1,100 nm. The wavefront sensor consists of a 1.3 megapixel CCD camera with USB 2.0 connectivity, a chrome mask microlens array and software to analyse the location and intensity of spots formed when a beam of light is directed through the lenses onto the CCD.

www.thorlabs.com