Developments towards an adaptive secondary mirror for KECK

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Abstract

TNO and partners at university of Hawaii and the Center for Adaptive Optics at UCSC are developing adaptive secondary mirror technology based on a unique electromagnetic actuator, which yields high efficiency in terms or force per unit volume and unit power. This actuator technology enables an overall compact and robust adaptive secondary mirror without the need for active cooling.
Several design studies have been performed to investigate the potential of an ASM's based on this technology for telescopes such as TMT, KECK, Gemini, and the European Solar Telescope.

Over the last three years several prototypes systems have been realized to verify the actuator technology and demonstrate its performance. Furthermore, a design upgrade of the actuators has been made that enable an even higher force density due to reduced size and easier manufacturing.

The current focus of the team is the realization of the ASM designed for the NASA Infra-red Telescope Facility (IRTF) and the University of Hawaii 2.2-meter Telescope with 36 and 210 actuators respectively. These systems are aimed to demonstrate the potential of this technology within a representative environment and on operational astronomical facilities on Mauna Kea.

In parallel, the team is developing the design of the Keck ASM which will have a diameter of Ø1.4 meters and between 2000 and 5000 actuators. The current focus is on the design of the lightweight and stiff support structure to support such large amount of actuators, and the packaging of the drive electronics.
This paper will present the latest test results of TNO's novel actuator technology, the integration status of the UH2.2-ASM and IRTF-ASM, and the design status of the KECK-ASM.

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