Contribution ID: **10** Type: **not specified**

Use of a modulation camera to control Fourier-filtering wavefront sensors measurements on the fly

lundi 28 octobre 2019 16:40 (20 minutes)

Fourier-filtering wavefront sensors (FFWFS) have demonstrated to be a really promising class of wavefront-sensors exhibiting highly sensitive elements (Zernike WFS, Pyramid WFS, etc…) while providing an exxtreme modularity which allows to use them for different purposes by changing the shape of their filtering masks (Ingot WFS). Now that they have strongly captured the interest of AO scientists, one of their major limitations has to be handled: their non-linear behaviour which degrades performance in closed loop operation. One way to deal with this aspect is to consider the FFWFS as linear-parameter varying systems, which means that they are working in a linear regime which changes at each iteration. We need to determine the so-called Optical Gains in order to track this linearity change through the loop and update the reconstructor accordingly. To achieve this goal, we propose the use of a modulation camera (a camera located after the modulation mirror which takes images of the PSF through one cycle of modulation) to probe the working regime of the FFWFS at any moment. We demonstrate that the knowledge of the modulated PSF combined with a convolutional description of the FFWFS can give us a real-time estimation of the Optical Gains. This innovative way to control FFWFS measurements has to be thought as one among several possibilities to track Optical Gains at each frame. Implementing such â€œon the flyâ€ feedback solutions in the AO loop appears to be a fundamental step to reach the full potential of FFWFS.

Auteur principal: M. CHAMBOULEYRON, Vincent (Laboratoire d'Astrophysique de Marseille)

Co-auteurs: NEICHEL, Benoit (ONERA); CORREIA, Carlos; SAUVAGE, J.-F.; M. FAUVARQUE, Olivier (Laboratoire d'Astrophysique de Marseille); Dr JANIN-POTIRON, Pierre (ONERA / LAM); FUSCO, Thierry (ONERA)

Orateur: M. CHAMBOULEYRON, Vincent (Laboratoire d'Astrophysique de Marseille)