

MECHANICAL MEASUREMENTS WITH IMAGES AND WAVES – 6 CFU LM

Rossi (54 hours)

The course "Mechanical measurements with images and waves" aims to develop students' skills in measuring the 2D and 3D shapes of objects, as well as displacement, strain, stress and velocity fields in solids and fluids, using the most innovative technologies for image generation and analysis in the visible and infrared range, and for scanning with laser beams, ultrasound and X-rays.

- Review of the physics of fields, waves and phenomena used in measurement systems
- Generation of analog images, lenses, geometrical optics
- Image digitization
- 2D measurements with images
- 3D measurements with images (stereo vision, photogrammetry, fringe-projection scanners, etc.)
- Scanning systems for 3D measurements (LIDAR, RADAR, SONAR, industrial X-ray tomography)
- Displacement and strain measurements (DIC, optical flow, markers)
- Temperature and mechanical stress field measurements (thermography, TSA)
- Velocity measurements (laser Doppler anemometry and vibrometry, PIV)
- Pressure measurements with images

Lectures are supplemented by hands-on classroom sessions using thermographic systems, scanners and photogrammetry systems.

Students may carry out a group project applying the measurement techniques covered in the course to classic or innovative problems in experimental mechanics.