



Technical University of Crete
School of Architecture
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Laser Scanning Vibrometry:

Applications in Non Destructive
Testing (NDT) of concrete, masonries
and heritage structures

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Laser Scanning Vibrometer

PSV-500H, Polytec Inc. [1.]



- TUC's Applied MEchanics Laboratory (AMEL) equipment.
- Structural dynamic applications in frequency domain.
- Integrated vibrations measuring system:

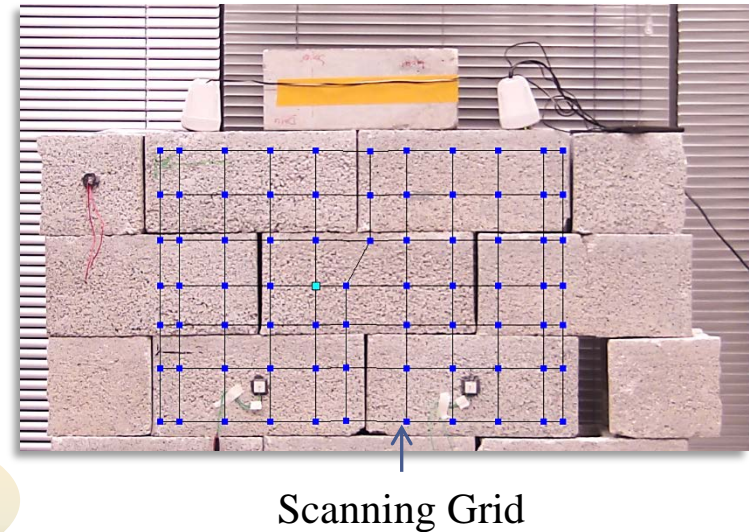
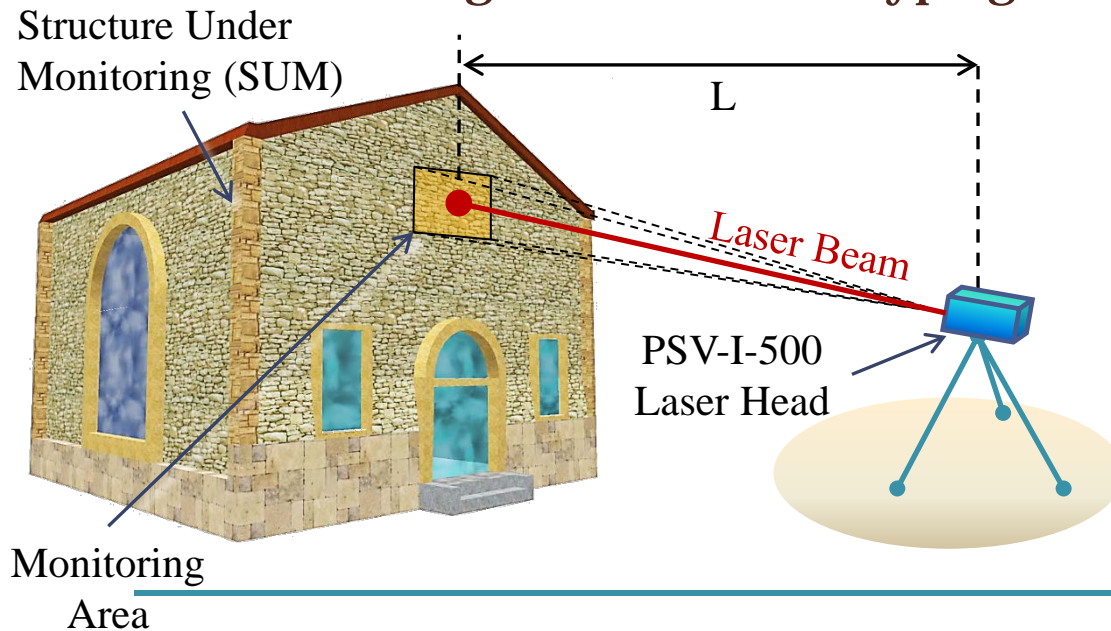


- Portable laser head and processing unit.
- 1D vibration's velocity measuring.
- Laser beam wavelength: 633 nm (red light) – 473 THz EM wave.
- Embedded data acquisition system.
- Bandwidth: 0 Hz-100 kHz.
- Max FFT points: 12800.
- Vibration amplitudes range: 1 mm/s – 10 m/s.

Laser Scanning Vibrometer

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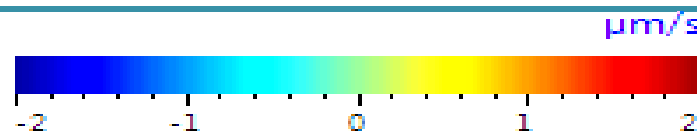
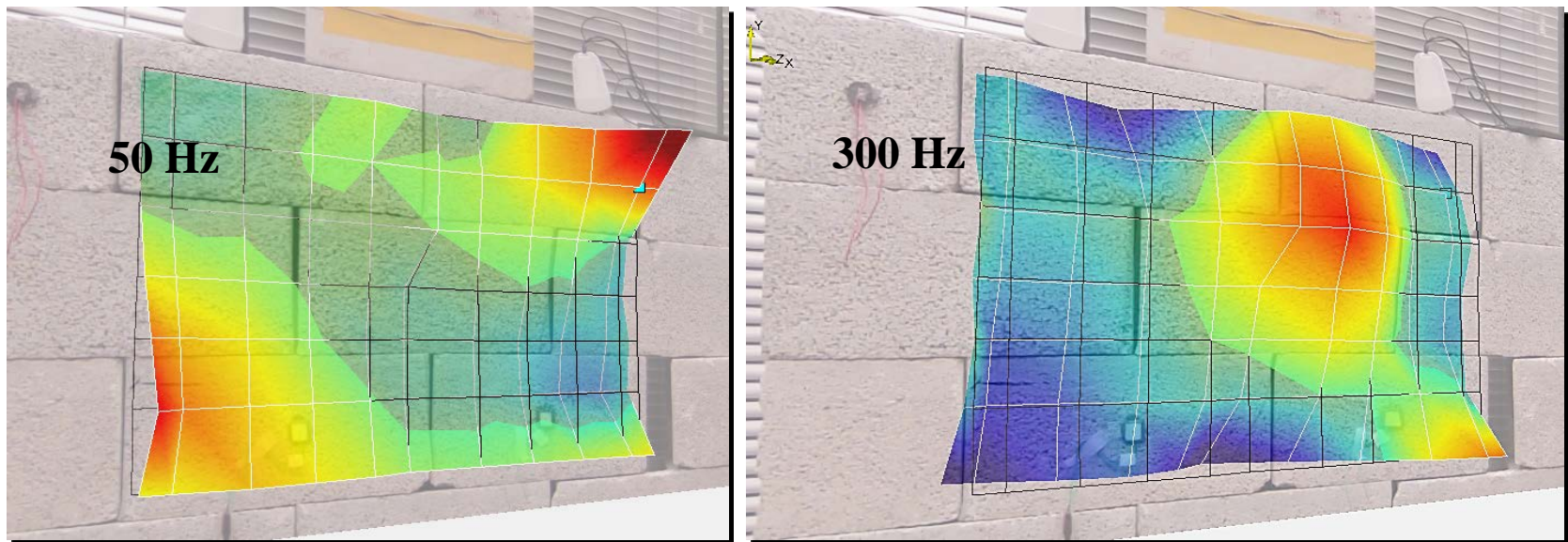
- Remote scanning of a structure's area **A**, varies from **mm²** to some **m²** (depends from distance **L**).
- Multi-point vibration velocity measurements on an custom-generated FEM-type grid.



3. Laser Scanning Vibrometer

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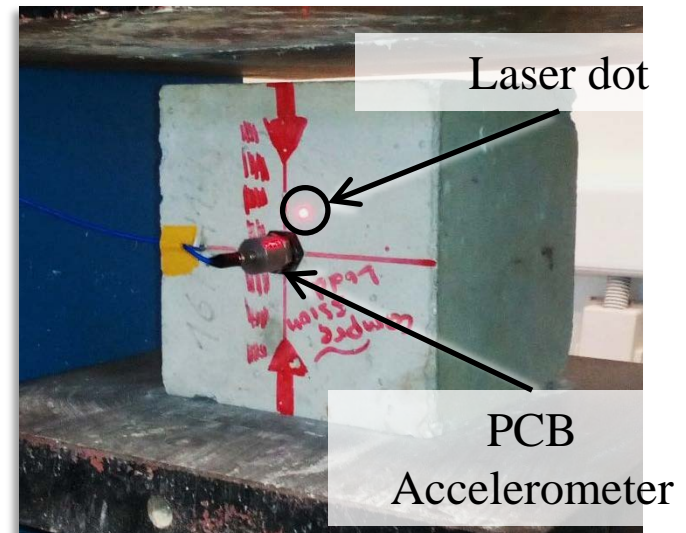
- Simulation of resonant frequencies related, vibration modes.
- Reliable representation of vibration mode could be succeeded by using as points vibration's phase reference, a surficial attached accelerometer.



4. LDV applications

Concrete cubic specimen damage monitoring

- Concrete cubic specimen (150x150x150mm).
- Forced to progressive collapse via 3 compression loading cycles (LC): 250kN, 500kN, 568kN.
- PCB accelerometer for vibration phase reference.



4. LDV applications

“Frangokastello” building blocks dynamic features evaluation

- Sandstone samples related to building materials are taken.
- Linear chirp signal excitation (100-1500Hz) via loudspeakers.
- Phase reference calculation via PCB Accelerometer (10mV/m/s²).

