

Multiple-Path LIDAR Vibrometer for Remote Modal Study of Reinforced Concrete Buildings. Matthieu Valla, ONERA (France); Julien Totems, LSCE (France); Béatrice Augère, Didier Goular, Didier Fleury, ONERA (France); Philippe Guéguen, Matthieu Perrault, ISTerre (France); and Christophe Planchat, ONERA (France).

ABSTRACT

Coherent lidars are able to finely measure the vibration velocity of remote targets. This allows Operative Modal Analysis (OMA) of potentially damaged buildings, for their diagnosis at a safe distance after a seismic event. As a next step from our previous work validating this method for modal frequency determination, we have assessed its capability to extract the full modal parameters of reinforced concrete buildings, including mode shapes, using multiple ambient vibrations measurements by lidar on the entire structure.

We report on the development and field trial of a 3-path lidar vibrometer for this purpose. After a description of the system, we show that application-related constraints are fulfilled: low velocity noise, real-time signal processing, compacity and laser safety. Then, we present the results of a real-scale trial on buildings at ONERA Palaiseau and in the city of Grenoble, France. We discuss the reliability of this technique for remote seismic integrity structural diagnosis.