Presentation title: Excitation and reception of guided Lamb waves in composite structures using ultrasonic transducers and arrays through the air gap

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Abstract (250-300 words):

Composite materials are now very widely used in various sectors, one of the main quality assurance procedures is the non-destructive evaluation of composite materials and products made from them. The aim of this work was to investigate the excitation and reception of guided Lamb wave modes in composite structures. To excite such modes, it is necessary to select appropriate frequencies, which depend on the type of mode, the thickness of the sample, and the elastic properties of the material. It is necessary to point out that in the frequency range where higher order modes may exist usually not single, but a several different modes may be excited. For identification of modes, we proposed the following identification criteria: the phase velocity c_{ph} and the angle of incidence θ_i. Propagation of guided waves in the composite materials was simulated by a finite element modelling. The modelling has been carried in order to determine most suitable for air-coupled excitation modes and corresponding frequency bandwidth. Ultrasonic guided waves in the composite material were excited by a contact and air-coupled PMN-PT strip-like piezoelectric transducers operating in the frequency range 40 - 50 kHz. The normal displacements of the guided wave were picked up by the POLYTEC laser interferometer. The analysis spatial distribution of particle displacements of propagating waves has shown that most promising are asymmetric A_1 and symmetric S_1 modes, as they possess relatively strong normal component of particles displacement on the surface of the plate at particular frequency bandwidth. An experimental investigation of the excitation and propagation of Lamb wave modes in GFRP material and verification of the numerical simulation results were performed. The obtained results clearly demonstrated the possibility to efficiently excite and receive different guided Lamb wave modes with very different phase velocities.

Biography (150-200 words):

Dr. J. Šeštokė is a researcher and has delivered 18 articles, of which, 13 articles have been published in Clarivate Analytics Web of Science journals including 10 articles with impact factor. She has also delivered 12 presentations at international conferences (USA, Germany, France, Lithuania, Taiwan (Republic of China), Sweden, Portugal). Researcher dr. J. Šeštokė defended her doctoral thesis in the field of technology (Measurement Engineering 10T) in 2016. J. Participates in national and

international projects. Dr. J. Šeštoke is well versed in finite modeling with ANSYS, ABAQUS and is well versed in 3D modeling in SolidWorks software packages. She performs measurements with a WayneKerr 6500B impedance analyzer, an ULTRALAB ultrasound system, an Olympus SZX 16 microscope using polarized light, and a POLYTEC OFV-5000 laser interferometer that measures mechanical, spatial displacements and transducer velocities. She is well versed in the movement of piezoelectric materials, including new generation PMN-PT materials, and their measurement methods. Reviewer of MDPI publisher and 13th ECNDT conference articles, winner of the American Patron scholarship, in 2022 she received a scholarship from the French agency for the promotion of higher education, admission and mobility.