

2019 ICU BRUGES

ABSTRACT BOOK

2019 INTERNATIONAL CONGRESS ON ULTRASONICS

BRUGES, BELGIUM
3-6 September 2019

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Thursday, September 5th, 2019 (11:00 am)

MCT+MEI (1/3) - Ultrasonic Characterization of Tissues and Elasticity Imaging

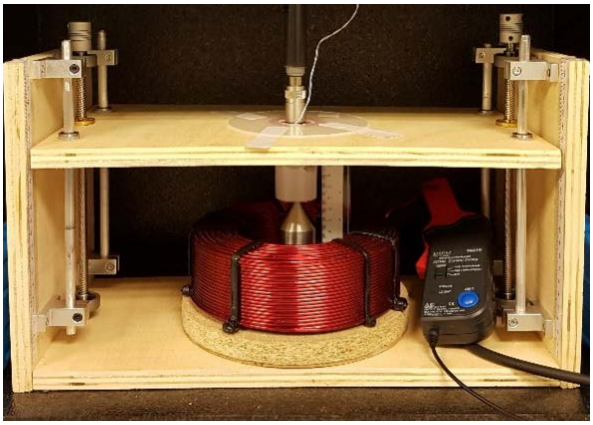
MCT+MEI (1/3): Ultrasonic Characterization of Tissues and Elasticity Imaging	Location: VIVES room A207 Chair: Nico Declercq and Guillermo Rus
11:00-11:30 When bubbles snowplough!	Rodolphe Antoine
11:30-11:45 Calcium sulfate setting monitoring with ultrasonic backscattering analysis	Josep Rodríguez-Sendra, Noé Jiménez, Rubén Picó, Joan Faus, Francisco Camarena
11:45-12:00 Magnetic force induced vibration on a ferromagnetic sphere for viscoelastic media characterization	Alejandro Cebrecos, Miguel Company, Noé Jiménez, José María Benlloch, Francisco Camarena
12:00-12:15 Mechanical biomarkers by torsional wave elastography for gestational diagnosis	Guillermo Rus, Jorge Torres, Rafael Muñoz, Juan Melchor, Ruben Molina, Antonio Callejas, Miguel Riveiro, José Cortes, Inas H Faris, Francisca Molina
12:15 - 12:30 Assessing viscoelasticity of torsional propagation in cervical tissue	Antonio Callejas, Juan Melchor, Inas H. Faris, Jorge Torres, Guillermo Rus

MAGNETIC FORCE INDUCED VIBRATION ON A FERROMAGNETIC SPHERE FOR VISCOELASTIC MEDIA CHARACTERIZATION

Alejandro Cebrecos[1], Miguel Company[1], Noé Jiménez[1], José María Benlloch[1], Francisco Camarena[1]

[1]*Instituto de Instrumentación para Imagen Molecular (i3M) CSIC, Universitat Politècnica de València, Camino de Vera, S/N, 46022, Valencia, Spain*

A new method that combines transient magnetic forces with ultrasonic imaging and allows the local experimental characterization of the complex shear modulus of a viscoelastic medium is presented. By measuring the dynamics of a ferromagnetic inclusion under the application of a magnetic force, the viscoelastic properties of the medium are extracted. The system is composed of a coil, which creates a magnetic field that induces displacement on a ferromagnetic particle located inside a test phantom, and an ultrasound transducer operating in pulsed-echo mode, utilized to track the displacement of the particle with spatial resolution of several m. Experiments were conducted embedding a ferromagnetic sphere on test phantoms with different compositions and at different temperatures. The obtained results are in good agreement with the theoretical estimation of the dynamical response of a sphere [1] and show robustness on the estimation of the viscoelastic parameters. Moreover, temperature dependent results show asymptotic elasticity values which are physically consistent for soft-solid media.



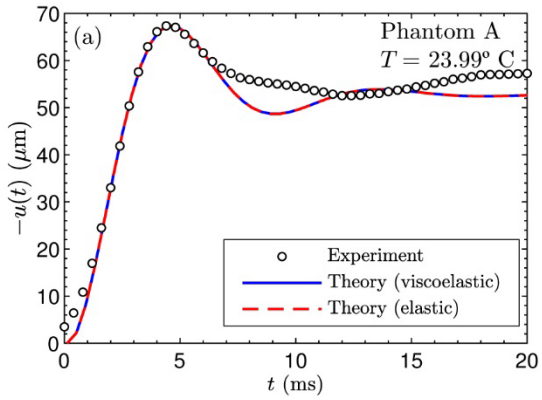


Figure 1: Experimental setup used for the experiments.
Figure 2: Dynamics of the sphere embedded in the (visco)-elastic media. (a) Displacement waveform for the phantom A at T = 23:99 C, measured experimentally (circles), using elastic theory (red line), and using viscoelastic theory (blue line).

Keywords
Ultrasound, MMUS, viscoelastic, transducer, magnetic, shear modulus.

References

[1] S. R. Aglyamov, A. B. Karpiouk, Y. A. Ilinskii, E. A. Zabolotskaya, S. Y. Emelianov, Motion of a solid sphere in a viscoelastic medium in response to applied acoustic radiation force: Theoretical analysis and experimental verification, J. Acoust. Soc. Am., 122 4, **2007,** 1927–1936.