

I INTERNATIONAL CONFERENCE ON BIODENTAL ENGINEERING

26 and 27 of June 2009
Porto, Portugal

Book of Abstracts

**Book of Abstracts of the
I International Conference on
BIODENTAL Engineering**

26-27 June, 2009

Porto, Portugal

Experimental measurement of the displacement field on a mandible in vitro

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Abstract

This paper presents an attempt to obtain the displacement field produced in a human mandible during the mastication. This information is of crucial importance in the stress estimation. Rubber bands fixed on mandible bone are used to simulate muscles and tendons being the load applied at the incisive teeth and controlled by a load cell. The temporomandibular joint and ligaments are implemented through the fixation of the mandible to a mechanic rig. The global boundary conditions were defined according to the anatomic model. The in-plane ESPI (Electronic Speckle Pattern Interferometry) technique [1] is used for the measurement of the global displacement field at mandible surface. The numerical simulation of the 3D model mandible [2], which includes the cortical and spongy bone, is performed using a commercial finite element method code, Ansys® [3]. The figure 1 shows the experimental results with ESPI and the numerical simulation.

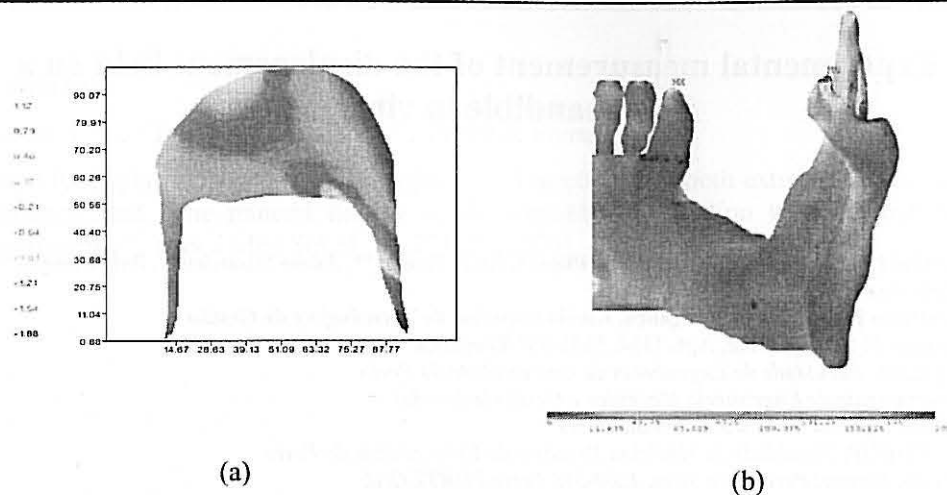


Figure 1. (a) Displacement field measured with ESPI; (b) Numerical simulation by Finite Elements [4].

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