

El Baroudi, Adil; Razafimahery, Fulgence; Rakotomanana, Lalaonirina R.

Parametric modal analysis of the brain-CSF-skull system. Influence of the fluid-structure interaction. (English. French summary) [Zbl 1278.76135](#)

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Summary: Dynamical behavior of the head during an impact is important for analyzing the induced local damage or diffuse damage in the brain tissue. We determine in the present study the natural frequencies and the modal shapes of the system of brain, cerebro-spinal fluid and skull. Two models are presented in this work: an elastic-acoustic model assuming a rigid skull and an elastic-acoustic-elastic model assuming a deformable skull. It is shown that natural frequencies and more significantly the modal shapes are strongly influenced by the interaction between solid phases (brain and skull) and the cerebro-spinal fluid.

MSC:

[76Z05](#) Physiological flows

[74L15](#) Biomechanical solid mechanics

[74F10](#) Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)

[92C10](#) Biomechanics

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Keywords:

modal analysis; cerebro-spinal fluid; fluid-structure interaction

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