

Acoustics meets bones

Supervisors

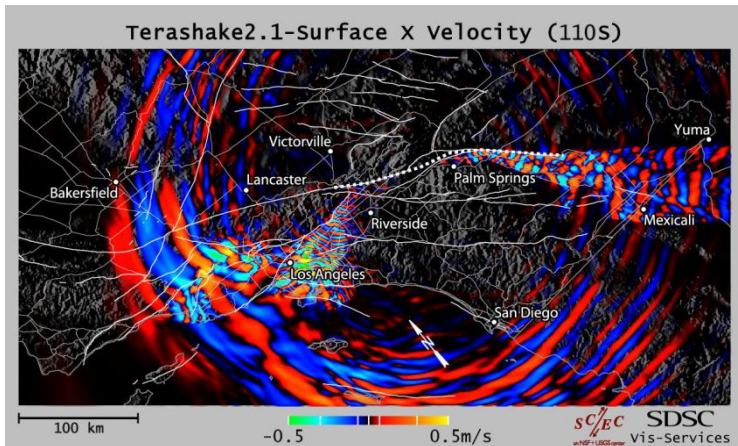
Hagen Wille and Vasco Varduhn

January 30, 2012

Acoustics ...

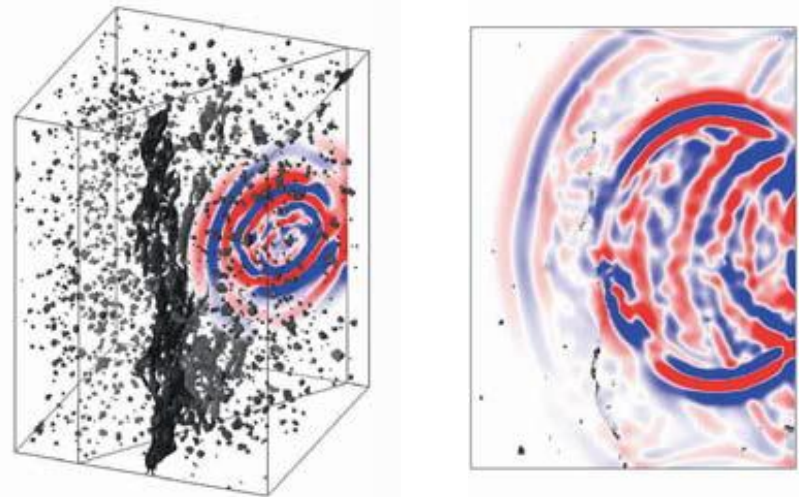
... is more than the generation and propagation of sound in a gas.

Example: seismology



visservices.sdsc.edu

Example: civil engineering



Kocur, G. – Diss. ETH No. 20368 (2012)

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Project Characteristics

Mechanics: ★★★★★☆
 Mathematics: ★★★★★☆
 Programming: ★★★★★★

- Within this project acoustic theory shall be applied to the CT scan of a human femur
- Challenges:
 - Complex geometry and a heterogeneous distribution of material properties
 - Fine resolution of CT scans resulting into grids of size up to $512 \times 512 \times 256 = 2^{26}$ points
- Your Task:
 - Understand the governing equations of acoustics for heterogeneous materials
 - Implement a Finite Difference scheme in C++ and test the software on a standard workstation; first in 2D than in 3D
 - Parallelize your program with OpenMP and test it on the chair's cluster
- Programming language: C++, OpenMP

