



Applied Mathematics

McGill Applied Mathematics Seminar

Dec. 4, 2006, 2:35 pm Monday
At McGill, Burnside Hall 1205

“Issues in modelling the mechanics of the middle ear”

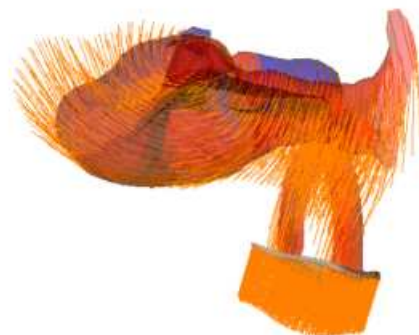
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Coffee and refreshments will be served after the seminar

Abstract:

Hearing loss is a common physical disability and the available diagnostic and corrective measures are often unsatisfactory. Diagnosis is especially problematic in newborns, for whom early diagnosis is very important. One reason for the difficulty of diagnosis is that the newborn middle ear is even less well understood than the adult one. Middle-ear prosthesis design is also an important clinical problem. The potential technology is increasingly sophisticated and there is a great variety of surgical options. There has been little mechanical analysis of any of them, however, and the results of middle-ear surgery are variable and unpredictable.

Understanding middle-ear mechanics is difficult because of the complexity of the system, the difficulty of the experimental measurements, and the great variability among ears. We approach this problem by using the finite-element method to develop quantitative models. In this talk I shall review the anatomy and function of the middle ear, and discuss some of the issues involved in creating models, including geometry, material properties and variability.



Model of human middle ear with simulated displacement vectors.