GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. ____

Project No. E-25-667 GTRI/~~GIT~~ DATE 5 /31 /84

Project Director: Dr. J. A. Boulet School/~~Lab~~ ME

Sponsor: National Science Foundation

Type Agreement: Grant No. MEA-8403953

Award Period: From 7/1/84 To ~~12/31/86~~ * (Performance) 3/31/87 (Reports)

Sponsor Amount:	This Change 12-31-84	Total to Date
Estimated: $		$ 48,000
Funded: $		$ 48,000

Cost Sharing Amount: $ 12,103 Cost Sharing No: E-25-315

Title: "Research Initiation: An Analytical Model of the Mammalian Cochlea"

ADMINISTRATIVE DATA OCA Contact Lynn Boyd x4820

1) Sponsor Technical Contact:

Clifford J. Astill
National Science Foundation
Washington, DC 20550

(202) 357-9542

2) Sponsor Admin/Contractual Matters:

Winston S. Sherman
Grants Official
National Science Foundation
Washington, DC 20550

(202) 357-9626

Defense Priority Rating: n/a Military Security Classification: n/a

(or) Company/Industrial Proprietary: n/a

RESTRICTIONS

See Attached NSF Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval — Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with GIT.

COMMENTS:

* Includes 6 month unfunded flexibility period, as usual

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FORM OCA 4:383

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Z1 SF 4428 2

Date 1/16/85

Project No. E-25-667 School ME

Includes Subproject No.(s) N/A

Project Director(s) Joseph Boulet GTRC / XXX

Sponsor National Science Foundation

Title "Research Initiation: An Analytical Model of the Mammalian Cochlea"

Effective Completion Date: 12/31/84 (Performance) 12/31/84 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [X] Final Report of Inventions
- [X] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Continues Project No. Continued by Project No.

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NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

FINAL PROJECT REPORT
NSF FORM 98A

PLEASE READ INSTRUCTIONS ON REVERSE BEFORE COMPLETING

PART I–PROJECT IDENTIFICATION INFORMATION

1. Institution and Address	2. NSF Program	3. NSF Award Number
School of Mechanical Engineering Georgia Institute of Technology Atlanta, Georgia 30332	Solid Mechanics	MEA-8403953
	4. Award Period From 7/1/84 To 12/31/84	5. Cumulative Award Amount $12,154

6. Project Title
Research to Establish an Improved Analytical Model of the Mammalian Cochlea

PART II–SUMMARY OF COMPLETED PROJECT *(FOR PUBLIC USE)*

To account more completely for viscous dissipation, and so to improve agreement with experimental results, two refinements of an existing analytical cochlear (inner ear) model have been investigated. The model is the first to include representation of the tectorial membrane, which overlies the sensory cells. The refinements are (a) enforcing the no-slip boundary condition at the four walls of each cochlear duct and (b) using realistic dimensions for the cochlear membranes in the vicinity of the sensory cells.

Refinement (a) was found to be insignificant in resolving the discrepancies between experimental results and previous predictions of the analytical model.

Fluid flow in the vicinity of the sensory cells is extremely sensitive to the spacing between the tectorial membrane and the organ of Corti, which supports the cells. In refinement (b), the geometry of this region is represented more realistically than it has been previously. As a result, viscous dissipation in this region is dramatically increased.

In previous cochlear models, viscous dissipation in the boundary layers at the duct walls has been the primary source of damping. The present investigation has shown that when the tectorial membrane is present, dissipation in the gap between it and the organ of Corti is orders of magnitude greater than that at the duct walls.

PART III–TECHNICAL INFORMATION *(FOR PROGRAM MANAGEMENT USES)*

1. ITEM *(Check appropriate blocks)*	NONE	ATTACHED	PREVIOUSLY FURNISHED	TO BE FURNISHED SEPARATELY TO PROGRAM	
				Check (√)	Approx. Date
a. Abstracts of Theses					
b. Publication Citations					
c. Data on Scientific Collaborators					
d. Information on Inventions					
e. Technical Description of Project and Results					
f. Other *(specify)*					

2. Principal Investigator/Project Director Name *(Typed)*	3. Principal Investigator/Project Director Signature	4. Date
Joseph A. M. Boulet		12/6/84

NSF Form 98A (5-78) Supersedes All Previous Editions

Form Approved OMB No. 99R0011