Disk Included

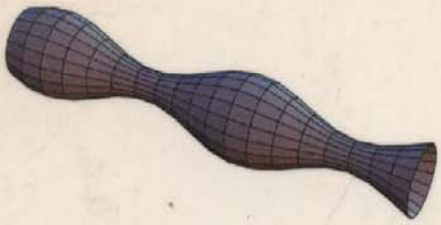
MATHEMATICA®

FOR SCIENTISTS AND ENGINEERS

Using Mathematica® to do Science

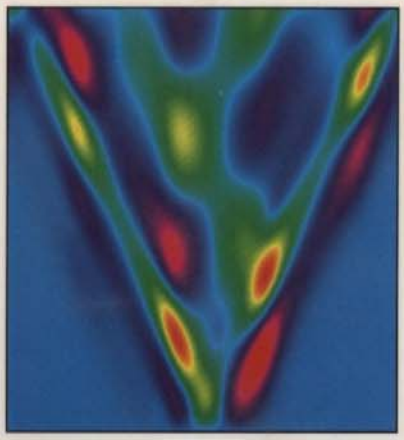
Richard Gass

Contents



$$\frac{1}{S}\frac{\partial}{\partial x}\left(S\frac{\partial \psi}{\partial x}\right) = \frac{1}{c^2}\frac{\partial^2 \psi}{\partial t^2} \qquad P = \rho\frac{\partial \psi}{\partial t}$$

```
FluidEquation = (1/S)
D[S D[ψ[x, t], x] - (1/c^2)
D[ψ[x, t], {t, 2}] c = 342;
T = 2 π /c;
solution = NDSolve[{FluidEquation
== 0, ψ[x, 0] == Exp[-(x)^2],
Derivative[0,1][ψ][x, 0] == 100,
ψ[-2 Pi, t] == ψ[2 Pi, t]}, {ψ},
{x, -2 Pi, 2 Pi},
{t, 0, T}][[1, 12]]
```



Disk Included

PRENTICE HALL
Upper Saddle River, NJ 07458
http://www.prenhall.com

Mathematica is a powerful computer language that allows the tight integration of symbolic, numeric, and graphic techniques. In *Mathematica for Scientists and Engineers: Using Mathematica to do Science,* Richard Gass provides a guide for scientific researchers, engineers, and students on using the power of *Mathematica* to solve scientifically interesting problems. On the left, for instance, is a nonuniform cross-section of a pipe, the partial differential equation that governs wave motion in the pipe, the *Mathematica* code that solves the equation, and a density plot of the excess pressure in the pipe.

MATHEMATICA® FOR SCIENTISTS AND ENGINEERS
Using Mathematica® to do Science

- is written for use with the newly released *Mathematica* 3.0 and can be used with *Mathematica* 2.2
- covers all major features of *Mathematica* including graphics programming, writing packages, and the new features in *Mathematica* 3.0 such as typesetting and notebook programming
- can be used as a reference, a self-paced learning tool, or as a text
- contains interesting physics, math, and engineering applications such as the three body problem, integration of chaotic systems, simulation of a cyclotron, spinning tops, and the solution of nonlinear partial differential equations
- assumes no prior knowledge of *Mathematica* but will also be of use to more advanced users in its application of *Mathematica* to difficult real-life problems where the naïve use of *Mathematica* may not work
- works many long, nontrivial examples in detail
- provides an abundance of problems and projects
- comes with an interactive CD that contains the complete text as a series of *Mathematica* notebooks with hyperlinks, animations, and color; the CD can be used with *Mathematica* 3.0 on all platforms and *Mathematica* 2.2 on Mac, Unix, and Windows.

ISBN 0-13-227612-7
90000
9 780132 276122