Linking SDSU Computational Science and Industry

Rob Mellors, Department of Geological Sciences/Computational Sciences

San Diego State University

Why? Mutually beneficial

SDSU benefits	Industry benefits
Expose students to "real-world" problems	*Source of well-trained new employees*
Additional source of support for students	*Access to specialized academic firepower and resources*

SDSU computational science resources

- Wide range of faculty from mathematics, science, and engineering spanning a variety of specialties (fluid dynamics, materials science, biophysics, bioinformatics, signal processing, data mining, computational and numerical expertise)
- Ph.D and M.S. students
- Computational resources (e.g. cluster, visualization)

How? Multi-tiered strategy

- Develop classes designed to streamline transition to industry (enhance teamwork, problem-solving, and communication skills)(no cost to industry)
- Provide access to faculty/student teams for specific problems ($)
- Develop focused consortiums with multiple faculty and associated students ($)

Example: class development

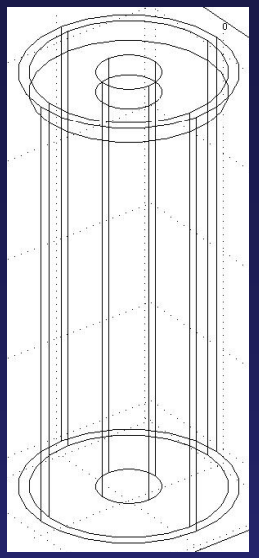
- Computation Sciences 670
  - Intended to mimic industry environment
  - Small group of students address a specific problem and write report
  - Faculty act as consultants
  - Enhance teamwork and flexibility
  - Objectives based in part on previous comments during ACSESS meetings

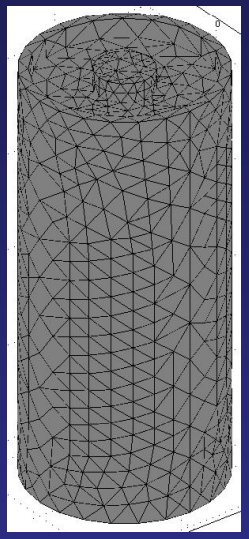
Sample problems

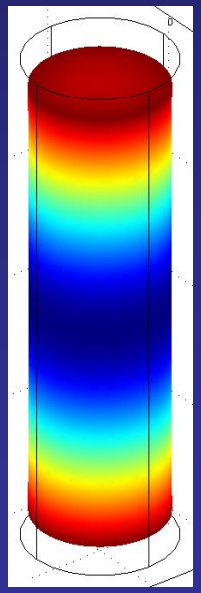
- Time series analysis and signal detection in noise.
- Numerical modeling of spark plasma sintering
- Analysis of customers preferences (Netflix)
- We will accept problems from industry (no charge)

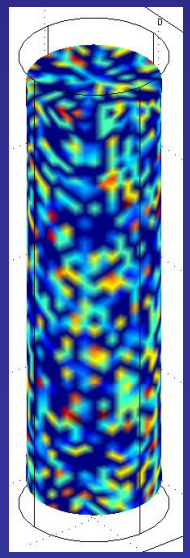
Example: Sintering

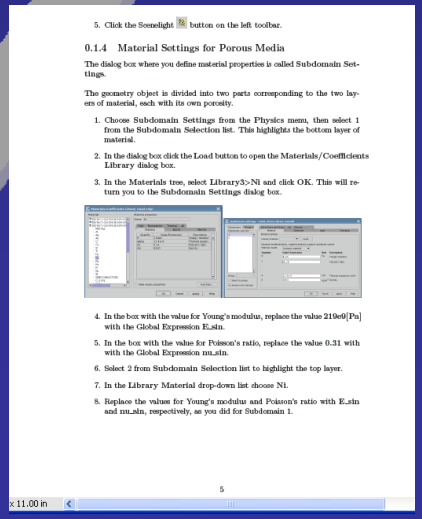
Tasks:
-Solve sintering problem using finite difference
- Write documentation
- Presentation (powerpoint & poster*)











5. Click the Scenelight button on the left toolbar.

0.1.4 Material Settings for Porous Media

The dialog box where you define material properties is called Subdomain Settings.

The geometry object is divided into two parts corresponding to the two layers of material, each with its own porosity.

1. Choose Subdomain Settings from the Physics menu, then select 1 from the Subdomain Selection list. This highlights the bottom layer of material.
2. In the dialog box click the Load button to open the Materials/Coefficients Library dialog box.
3. In the Materials tree, select Library3->Ni and click OK. This will return you to the Subdomain Settings dialog box.

4. In the box with the value for Young's modulus, replace the value 219e9[Pa] with the Global Expression E_sin.
5. In the box with the value for Poisson's ratio, replace the value 0.31 with with the Global Expression nu_sin.
6. Select 2 from Subdomain Selection list to highlight the top layer.
7. In the Library Material drop-down list choose Ni.
8. Replace the values for Young's modulus and Poisson's ratio with E_sin and nu_sin, respectively, as you did for Subdomain 1.

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Images courtesy of
M. Abouali
S. Akhter
C. Garcia
B. Runyan
R. Schmieder
D. Torres

*poster is displayed here

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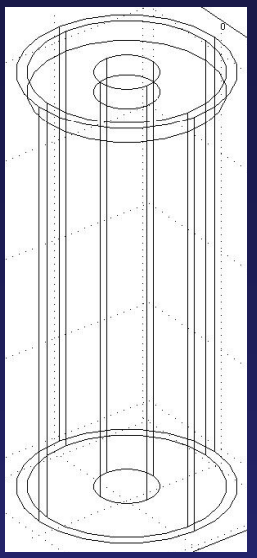

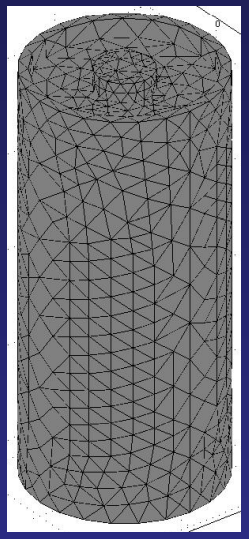

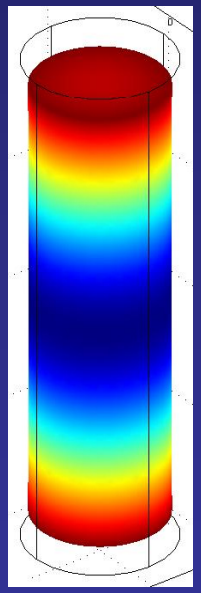

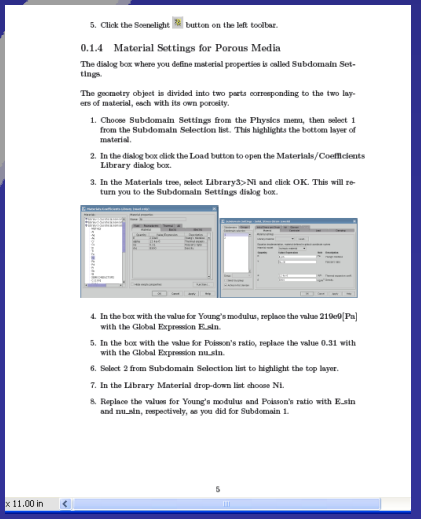

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Faculty/student teams

- Provide support for a specific student(s) to work on a problem.
- Includes some allocation for faculty and computer resources.
- May form part of a student thesis
- One summer ~ $10,000

Consortium

- Research on a given problem supported by yearly fees (for example, seismic wave imaging).
- Gain access to latest results and codes.
- Yearly workshop to show results.
- Need group of companies.

Conclusions

- Industry participation is essential for success.
- Beneficial to industry as well.
- Wide range of options with considerable flexibility.
- Contact me with questions or comments

rmellors@geology.sdsu.edu
619-594-3455