



Florida Atlantic University  
College of Engineering & Computer Science

# **Technology Enhanced Learning For Delivering Mechanical Engineering Courses**

**Chaouki Ghenai, Ph.D.**

**Ocean/Mechanical Engineering Department**

**Teaching With Technology Showcase - October 24, 2009**

## **Technology Enhanced Learning:**

Integrates education and information technologies into academic environment.

Used to optimize and enhance students learning

Allows for interactive environment that maximize learning by challenging the students to be creative.

Helps faculty, student and staff to explore and implement technologies for delivering courses on campus and distance learning.

## **Technology Enhanced Learning:**

1. Florida Engineering Education Delivery System (FEEDS)
2. Citrix Systems
3. Web based Simulation
4. Black Board
5. Digital Pad

## **TEL – Florida Engineering Education Delivery System (FEEDS):**

- Delivering graduate and undergraduate engineering courses to students over the internet
- Mechanical Engineering Courses:

Dynamics/ Statics/ Thermodynamics/ Heat Transfer/ Fluid Mechanics/ Computational Fluid Dynamics/ Applied Combustion

## **TEL – Florida Engineering Education Delivery System (FEEDS):**

- Lectures can be viewed by streaming video after the on-campus lecture has finished.
- With streaming video, students have the convenience of accessing their course anywhere with a computer that has Windows Media Player 10 and a high-speed Internet connection

# FLORIDA ATLANTIC UNIVERSITY

## TEL – FEEDS (Streaming Video in Black Board)

Blackboard Academic Suite - Windows Internet Explorer

http://blackboard.fau.edu/webapps/portal/frameset.jsp?tab\_id=\_2\_1&url=%2fwebapps%2fblackboard%2fexecute%2fauncher%3ftype%3dCourse%26id%3d\_99457\_1%26url%3d

Google

File Edit View Favorites Tools Help

hp Yahoo! Web Search Bookmarks Settings Mail My Yahoo! Answers

Blackboard Academic Suite

Home Help Logout

FAU  
BLACKBOARD

Welcome Courses Community Tutorials Scholar Faculty Students Honor Code IRM

Select: Learning Unit Go

1 Syllabus  
SyllabusFall2009.pdf (150.336 Kb) [Modify] [Manage] [Copy] [Remove]

2 Chapter 1: Introduction - Part 1  
Chapter1EMG3400Dynamics-Part1.pdf (348.051 Kb) [Modify] [Manage] [Copy] [Remove]

3 Chapter 1: Introduction - Part 2  
Chapter1-Part2.pdf (1.332 Mb) [Modify] [Manage] [Copy] [Remove]

4 08/25/2009 01:58:00 PM - Dynamics (EGM 3400-f09) Fall 09  
Enabled: Statistics Tracking  
Capture Date/Time: 08/25/2009 01:58:00 PM  
Dynamics (EGM 3400-f09) Fall 09  
Download Lecture Audio  
Download Enhanced Lecture Audio  
Download Lecture Video [Modify] [Manage] [Copy] [Remove]

5 08/27/2009 01:58:00 PM - Dynamics (EGM 3400-f09) Fall 09  
Enabled: Statistics Tracking  
Capture Date/Time: 08/27/2009 01:58:00 PM  
Dynamics (EGM 3400-f09) Fall 09  
Download Lecture Audio  
Download Enhanced Lecture Audio  
Download Lecture Video [Modify] [Manage] [Copy] [Remove]

6 Chapter 2: Kinematics of Particles - Part 1  
Chapter2-Part1.pdf (1.31 Mb) [Modify] [Manage] [Copy] [Remove]

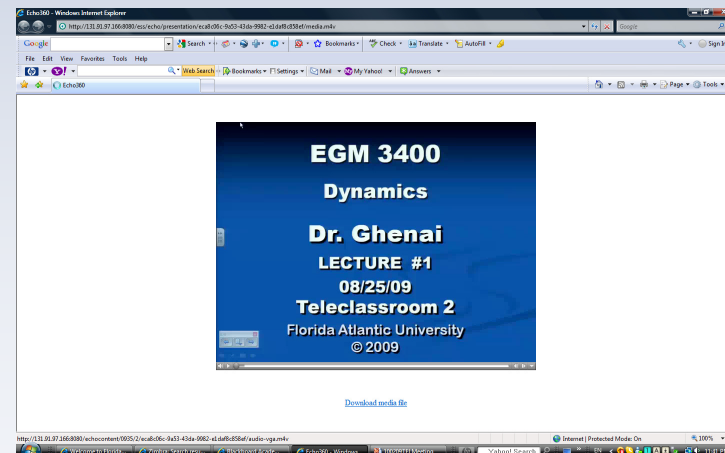
7 09/01/2009 01:58:00 PM - Dynamics (EGM 3400-f09) Fall 09 [Modify] [Manage] [Copy] [Remove]

Internet | Protected Mode: On 100%

Welcome to Florida... Zimbra: Search resul... Blackboard Academ... 100209TELMeeting Yahoo! Search EN 11:39 PM

# FLORIDA ATLANTIC UNIVERSITY

## TEL – FEEDS (Computer Center )



Teaching With Technology Showcase - October 24, 2009

## **TEL – Web-Based Simulation and Visualization (WBSV):**

- Interactive modules that use Web-based simulation and visualization (WBSV) are also used to enhance the student learning.
- WBSV are used in ME courses (Dynamics, Fluid Mechanics and Computational Fluid Dynamics) to complement student learning achieved through physical laboratories and conventional classroom instruction



# FLORIDA ATLANTIC UNIVERSITY

## Course Wide Content – Interactivities

Giambattista - Windows Internet Explorer

http://www.mhhe.com/physsci/physical/giambattista/index.html

Google Search

File Edit View Favorites Tools Help

hp Web Search Bookmarks Settings Mail My Yahoo! Answers

Giambattista

Installing the Java 2 plugin is **strongly recommended**. Click [here](#) to download and install the plugin.

Internet | Protected Mode: On 100%

copy web site... Zimbra: Search... Interactivities... Giambattista -... TELearning 100209TELM... Yahoo! Search EN 10:48 PM

# FLORIDA ATLANTIC UNIVERSITY

## Interactivities: Projectile Motion – Biker

Projectile Motion - Windows Internet Explorer

http://www.mhhe.com/physsci/physical/giambattista/proj/projectile.html

Google Search

File Edit View Favorites Tools Help

hp Yahoo! Web Search Bookmarks Settings Mail My Yahoo! Answers

Projectile Motion

**PROJECTILE MOTION TUTORIAL**

Game: ☒ Biker ☐ Archer Play Simulation Speed: 0.12x

View: ☐ Show Axis Step Angle: 51.4

Side Vel. & Acc. Reset Velocity: 7.8 m/s

Internet | Protected Mode: On 100%

copy web ... Zimbra: Se... Interactivit... Projectile ... TELearning 100209TEL... Document... Yahoo! Search EN 10:42 PM

## **TEL - Citrix System:**

- Citrix System is used for delivering information technology (IT) solutions that enhance and expand the educational experience for mechanical engineering students.
- Citrix Systems is used for visualization and remote access software for delivering applications over a network and the internet.

## **TEL - Citrix System:**

- Software such as Matlab, Ansys, Fluent, Visual Studio, Solid Works, Labview, and Maple are available through Citrix system for interactive classroom.
- Citrix System is also used by students on campus (laptop classroom) and off campus to remotely access and run software without having the software loaded onto their personal computers.

## **TEL - Citrix System:**

- GoToMeeting: Online courses that feature two-way audio and video interactions between students and the instructor.
- Another advantage is the ability for students to remotely access and run professional grade software without having the software loaded onto their personal computers.
- The software product that permits this type of operation is Citrix's Presentation Server

# FLORIDA ATLANTIC UNIVERSITY

## TEL - Citrix System

The screenshot shows a web browser window titled "Citrix Access Platform - Windows Internet Explorer". The address bar displays the URL <http://genie.eng.fau.edu/Citrix/AccessPlatform/site/default.aspx>. The browser's search bar contains the text "nokia surge". The page header features the Citrix logo on the left and the Florida Atlantic University Geomatics Engineering Program logo on the right. The main content area is divided into two columns. The left column, titled "Applications", lists various software applications with folder icons: ADS2008U2, Ansys, Fluent, MatLab, Mentor Graphics, Office 2003, Office 2007, PSpice, Rational, Transportation, VisualStudio2008, Citrix - SolidWorks, CMD, CST Studio 2008, EPANet 2, Firefox, HAP 4 31 Carrier, J Developer 10, and a folder named "Citrix". The right column, titled "Welcome", contains the following text: "First time logging in, you must install the Citrix Web client, which you can download here: Windows - <https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/ica32Web.msi> MAC osX - [https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/MacICA\\_OSX.zip](https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/MacICA_OSX.zip). Please use your FAU account to login. In the Domain field, you must enter FAU. Fluent/Gambit Users - Please launch "My Computer - Fluent" first; on Gambit, you must change your working directory to "Z:\ " in the startup window. For help with technical issues, please contact <mailto:help@eng.fau.edu>". Below this is a "Message Center" section with a message: "There are no existing applications available for reconnection." The browser's status bar at the bottom shows "Internet | Protected Mode: On" and the system clock displays "10:58 PM".

Citrix Access Platform  
<http://genie.eng.fau.edu/Citrix/AccessPlatform/site/default.aspx>

FLORIDA ATLANTIC UNIVERSITY  
GEOMATICS ENGINEERING PROGRAM

### Applications

Top Up

- ADS2008U2
- Ansys
- Fluent
- MatLab
- Mentor Graphics
- Office 2003
- Office 2007
- PSpice
- Rational
- Transportation
- VisualStudio2008
- Citrix - SolidWorks
- CMD
- CST Studio 2008
- EPANet 2
- Firefox
- HAP 4 31 Carrier
- J Developer 10
- Citrix

### Welcome

First time logging in, you must install the Citrix Web client, which you can download here:  
Windows - <https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/ica32Web.msi>  
MAC osX - [https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/MacICA\\_OSX.zip](https://genie.eng.fau.edu/Citrix/AccessPlatform/Clients/MacICA_OSX.zip)

Please use your FAU account to login. In the Domain field, you must enter FAU

Fluent/Gambit Users - Please launch "My Computer - Fluent" first; on Gambit, you must change your working directory to "Z:\ " in the startup window

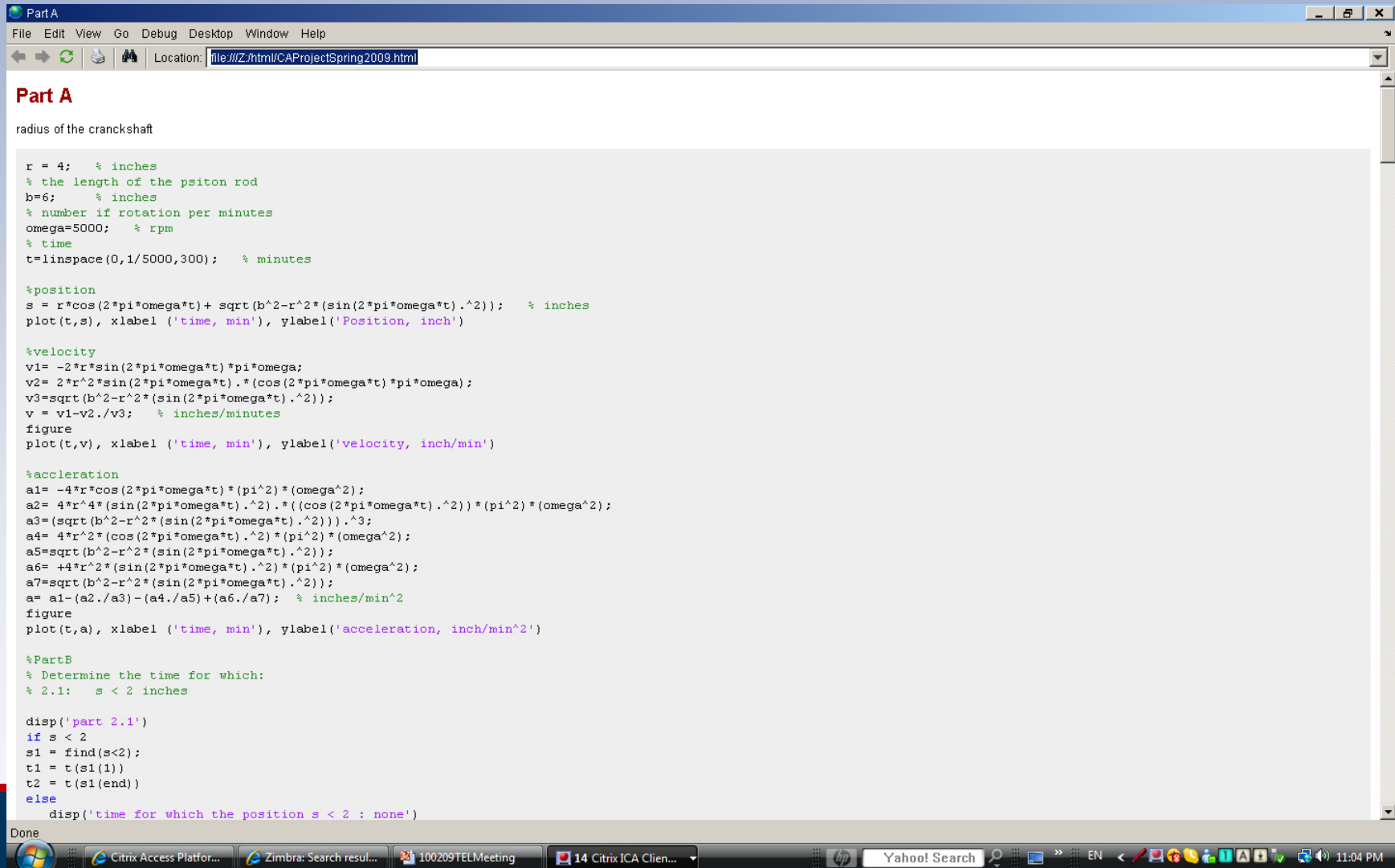
For help with technical issues, please contact <mailto:help@eng.fau.edu>

### Message Center

There are no existing applications available for reconnection.

Internet | Protected Mode: On 100% 10:58 PM

## TEL - Citrix System – Matlab



The screenshot displays a Citrix session interface. At the top, a blue header bar contains the Florida Atlantic University logo and name. Below this, a large black title bar reads 'TEL - Citrix System – Matlab'. The main content area shows a web browser window titled 'Part A' with a URL bar indicating the file path 'file:///Z:/html/CAProjectSpring2009.html'. The browser window displays a MATLAB script for calculating the position, velocity, and acceleration of a piston rod. The script includes comments in green and code in black. The script defines variables for radius (r), length of the piston rod (b), rotation speed (omega), and time (t). It then calculates the position (s), velocity (v), and acceleration (a) of the piston rod. The script is divided into three parts: Part A (calculating position, velocity, and acceleration), Part B (determining the time for which the position s is less than 2 inches), and Part C (determining the time for which the position s is less than 2 inches). The script ends with a 'disp' command to display the results.

```
Part A
radius of the crankshaft

r = 4; % inches
% the length of the piston rod
b=6; % inches
% number of rotation per minutes
omega=5000; % rpm
% time
t=linspace(0,1/5000,300); % minutes

%position
s = r*cos(2*pi*omega*t)+ sqrt(b^2-r^2*(sin(2*pi*omega*t).^2)); % inches
plot(t,s), xlabel('time, min'), ylabel('Position, inch')

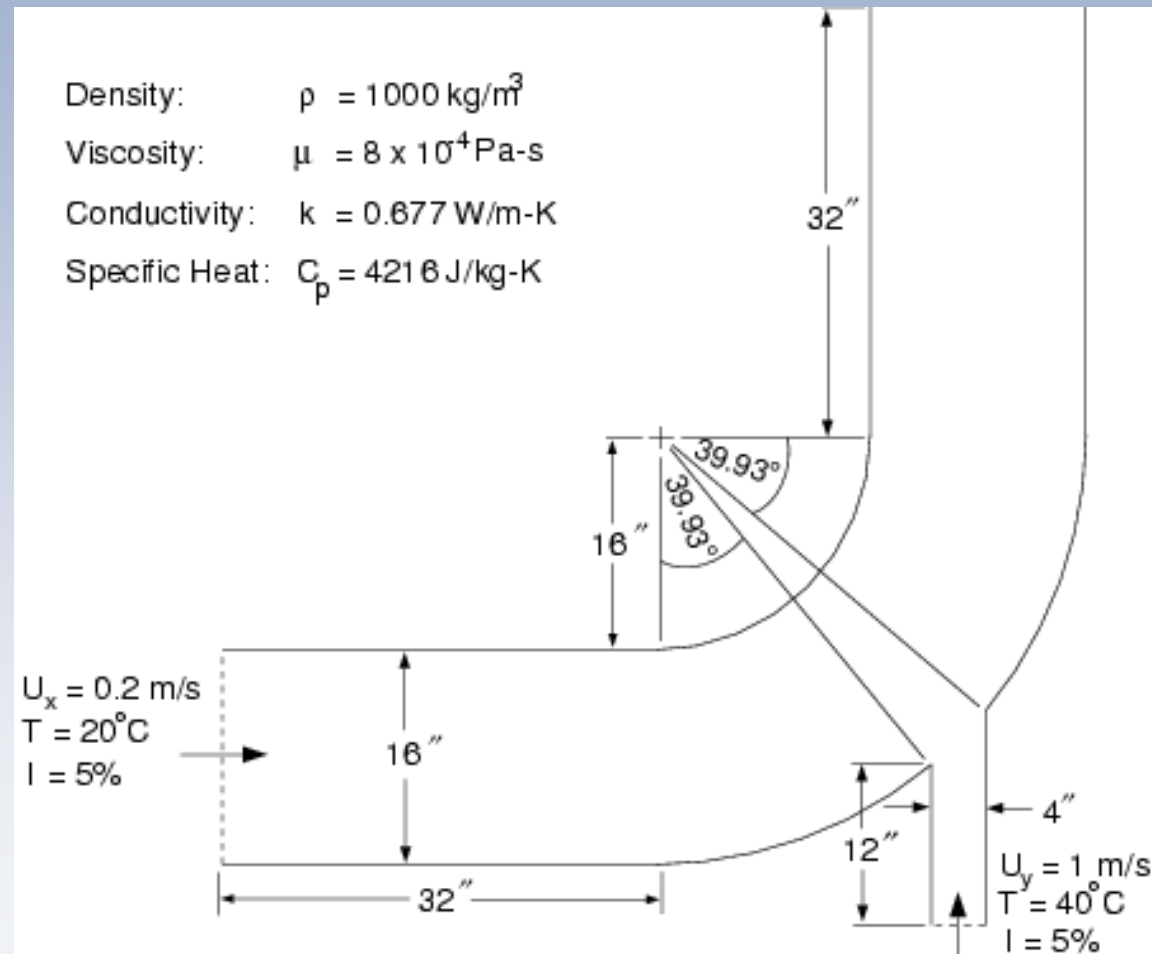
%velocity
v1= -2*r*sin(2*pi*omega*t)*pi*omega;
v2= 2*r^2*sin(2*pi*omega*t).*(cos(2*pi*omega*t)*pi*omega);
v3=sqrt(b^2-r^2*(sin(2*pi*omega*t).^2));
v = v1-v2./v3; % inches/minutes
figure
plot(t,v), xlabel('time, min'), ylabel('velocity, inch/min')

%acceleration
a1= -4*r*cos(2*pi*omega*t)*(pi^2)*(omega^2);
a2= 4*r^4*(sin(2*pi*omega*t).^2).*((cos(2*pi*omega*t).^2)*(pi^2)*(omega^2);
a3=(sqrt(b^2-r^2*(sin(2*pi*omega*t).^2)).^3;
a4= 4*r^2*(cos(2*pi*omega*t).^2)*(pi^2)*(omega^2);
a5=sqrt(b^2-r^2*(sin(2*pi*omega*t).^2);
a6= +4*r^2*(sin(2*pi*omega*t).^2)*(pi^2)*(omega^2);
a7=sqrt(b^2-r^2*(sin(2*pi*omega*t).^2);
a= a1-(a2./a3)-(a4./a5)+(a6./a7); % inches/min^2
figure
plot(t,a), xlabel('time, min'), ylabel('acceleration, inch/min^2')

%PartB
% Determine the time for which:
% 2.1: s < 2 inches

disp('part 2.1')
if s < 2
s1 = find(s<2);
t1 = t(s1(1))
t2 = t(s1(end))
else
disp('time for which the position s < 2 : none')
```

## TEL - Citrix System – Fluent for CFD

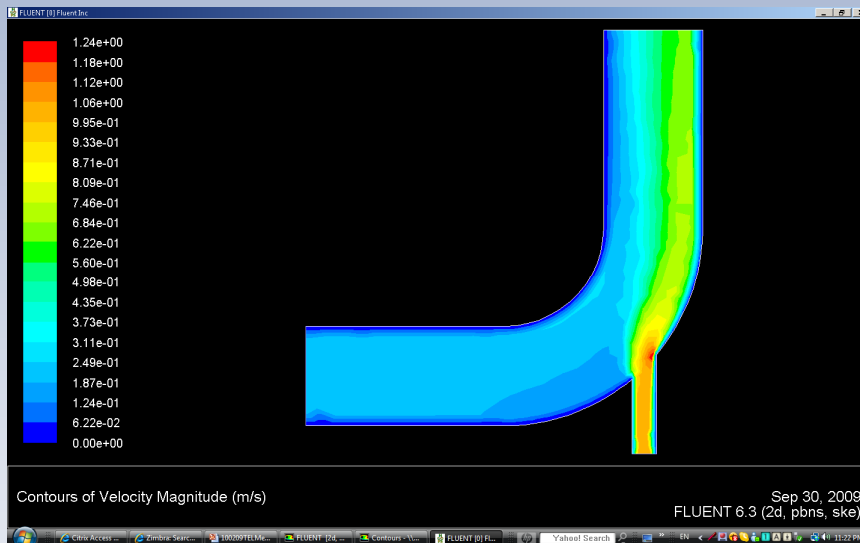


**Fluid Flow and Heat Transfer in Mixing Elbow**

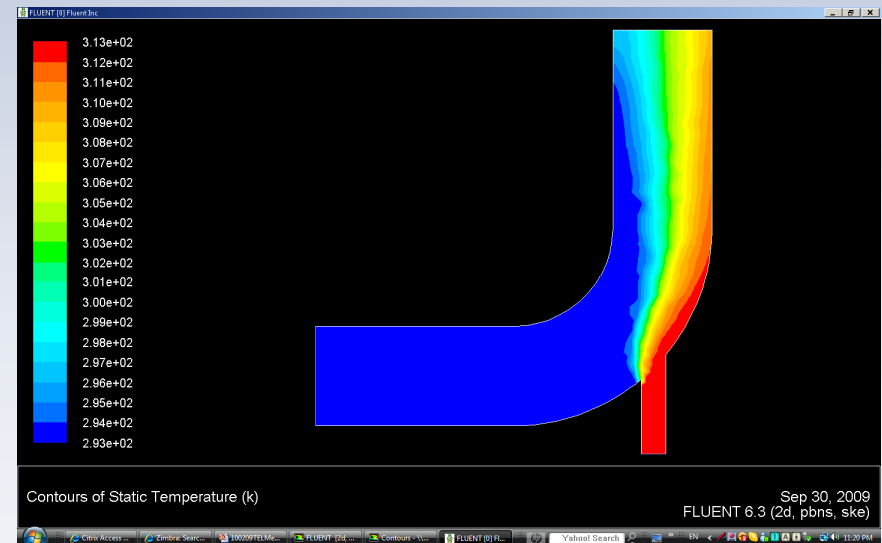


## TEL - Citrix System – CFD with Fluent

### Velocity Magnitude



### Temperature



## CFD Results

## TEL – Back Board:

- **Blackboard** is used by students to:
  - Access course information
  - Participate in online discussions with their professor and classmates
  - Obtain homework assignments and self-assessment quizzes
  - Track their academic schedule and grades

# FLORIDA ATLANTIC UNIVERSITY

## TEL – Back Board (Combined Section for Feeds and Non Feeds Students)

Blackboard Academic Suite - Windows Internet Explorer

http://blackboard.fau.edu/webapps/portal/frameset.jsp

Google

File Edit View Favorites Tools Help

Blackboard Academic Suite

Welcome Home Help Logout

FAU BLACKBOARD

Welcome, Chaouki

Please note that Internet Explorer 8 is **not** compatible with Blackboard and will cause problems when taking online tests (see additional info below).

**IRM Links**

- Help Desk
- Computer Labs
- FAUNet ID
- Faculty/Staff Training

**FAU Info**

- Campus Maps
- E-mail/Phone Directory
- Bookstore
- Academic Calendar

**Blackboard Support**

**Submit a Ticket**

ONLINE SUPPORT CENTER

FAU's [Online Computing Support Center](#) allows you to search the **Knowledge Base** for answers to common questions.

You can also submit your own help ticket by clicking on "Submit a ticket".

Log on using your FAU e-mail address ([username@fau.edu](#)) and your password (by default your first name in lower case).

If the Blackboard server is not available at night or on the weekend, please contact the FAU Help Desk at 561-297-3999.

**FAU on iTunes U**

**Ready to Podcast?**

iTunes U provides access to a wide range of digital audio and video content via the iTunes Store at no cost. Through a new tool available via Blackboard, you can now upload audio and video files to a restricted area within iTunes U and then create a link between your course site and iTunes U content without having to direct your students to a separate login. For more information, visit [http://www.fau.edu/irm/blackboard/pdf/itunes\\_u.pdf](http://www.fau.edu/irm/blackboard/pdf/itunes_u.pdf).

**Be Prepared: H1N1 and Blackboard**

FAU has published recommendations for faculty should there be an outbreak of H1N1 flu on campus

**NOTE:** Only the courses you are enrolled in that are using Blackboard this semester will be listed when you log in. Course enrollments are updated once a day. If you cannot login 24 hours after registering please submit a ticket through the online helpdesk <http://www.fau.edu/helpdesk>

**My Courses**

**Courses you are teaching:**

- EML6726\_2009S\_combined: Adv Computatnl Fluid Dynamics (unavailable)
- EML4930\_2008F\_combined: Applied Combustion (unavailable)
- EML2538001\_2008F\_85201: Computer Applications in ME 1 (unavailable)
- EML2538001\_2009S\_12176: Computer Applications in ME 1 (unavailable)
- EML2538001\_2009F\_85201: Computer Applications in ME 1 (unavailable)
- EGM3400\_2009F\_combined: Dynamics

**Announcements**

- New Echo Content: Dynamics (EGM 3400-09) Fall 09
- New Echo Content: Dynamics (EGM 3400-09) Fall 09
- New Echo Content: Dynamics (EGM 3400)
- EGM3400\_2009R\_combined: Dynamics (unavailable)
- EML3701\_2009R\_combined: Fluid Mechanics (unavailable)
- EML4262001\_2008F\_85205: Machine Design 2 (unavailable)
- EML4262001\_2009F\_85205: Machine Design 2
- EML4262001\_2009S\_12189: Machine Design 2 (unavailable)
- EML4730L001\_2008F\_83237: Mechanical Engineering Lab (unavailable)

**Change Password**

To change your Blackboard password:

Internet | Protected Mode: On

100%

Yahoo! Search

11:37 PM

## TEL – DigiMemo: Digital Writing Pad

- Device with storage capabilities that digitally capture and store everything you write or draw on ordinary paper
- View, edit, and share your hand written notes with students

### Take Notes



### Connect to a PC



### Organize your notes



### Send via e-mail or post in blackboard



# FLORIDA ATLANTIC UNIVERSITY

090809.dnd - ACECAD DigiMemo Manager

File Edit View Tool Page Help

Highlighter

- 1 - 03/23/09

STATIC FORCE ANALYSIS

①  $\sum F = 0$   
②  $\sum \tau_0 = 0$

Ex: Free Body Diagram: Vice-grip plier

Ground:  $t = t_{\eta} \times (\omega \phi)$

PAGE 1 Letter NUM

start Microsoft PowerPoint ... LectureNotes 090809.dnd - ACECA... 4:29 PM

The lecture notes using the digital pad are posted in black board for Feeds and Non Feeds Students