

**PHY 711 Classical Mechanics and
Mathematical Methods
10-10:50 AM MWF Olin 103**

**Plan for Lecture 33:
Chapter 10 in F & W: Surface waves
-- Non-linear contributions and soliton
solutions**

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Day	Date	Chap.	Topic	Exam
Fri	10/25/2013	Chap. 5	Rigid rotations	#21
Mon	10/28/2013	No class	Take-home exam	
Wed	10/30/2013	No class	Take-home exam	
Fri	11/01/2013	No class	Take-home exam	
Mon	11/04/2013	Chap. 8	Oscillations in two-dimensional membranes	Take-home exam due
Wed	11/06/2013	Chap. 9	Physics of fluids	#22
Fri	11/08/2013	Chap. 9	Physics of fluids	#23
Mon	11/11/2013	Chap. 9	Sound Waves	#24
Wed	11/13/2013	Chap. 9	Sound Waves	#25
Fri	11/15/2013	Chap. 9	Non linear effects in Sound	#26
Mon	11/18/2013	Chap. 10	Surface waves	
Wed	11/20/2013	Chap. 10	Surface waves	preparation for presentations
Fri	11/22/2013	Chap. 11	Heat conduction	
Mon	11/25/2013	Chap. 12	Viscous fluids	
	Wed, 11/27/2013		Thanksgiving Holiday	
	Fri, 11/29/2013		Thanksgiving Holiday	
Mon	12/02/2013		Student presentations I	
Wed	12/04/2013		Student presentations II	
Fri	12/06/2013		Student presentations III	
Mon	12/09/2013		Begin Take-home final	

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WAKE FOREST UNIVERSITY Department of Physics

News

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WFU research highlighted in Nature and Nature Materials

Graduate Student Andrea Belanger Selected for Technology Transfer Internship

Thonhauser group receives funding to investigate MOFs for carbon capture and catalysis

Events

Mon. Nov. 18, 2013
MS. Defense:
Nicholas Legley
11 AM in Olin 103

Wed. Nov. 20, 2013
Prof Curt A. Richter, NIST
Measurements to Enable Emerging Nanoelectronics
4:00 PM in Olin 103
Refreshments at 3:30 PM

Wed. Nov. 27, 2013
Thanksgiving Holiday

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WFU Physics Colloquium

TITLE: Measurements to Enable Emerging Nanoelectronics

SPEAKER: Dr. Curt A. Richter,
*NanoElectronics Group,
 Semiconductor & Dimensional Metrology Division,
 Physical Measurement Laboratory,
 National Institute of Standards and Technology*

TIME: Wednesday November 20, 2013 at 4:00

PLACE: Room 101 Olin Physical Laboratory

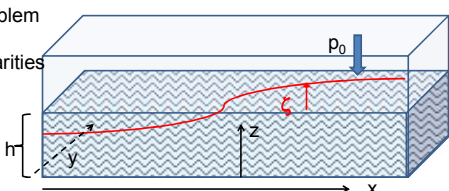
Refreshments will be served at 3:30 PM in the Olin Lounge. All interested persons are cordially invited to attend.

ABSTRACT

Traditional computing devices have been based upon the scaling of silicon-based complementary metal oxide semiconductor (CMOS) devices, but this scaling is reaching fundamental limits. The semiconductor industry is facing difficult challenges extending integrated circuit technology performance, and innovative technologies to store and manipulate are being aggressively pursued. These emerging technologies rely on the integration of novel materials such as graphene, nanowires, and compound semiconductors as well as new device structures such as tunnel-FETs and resistance change memories. New measurements are needed to enable research, development, and

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General problem including non-linearities



Within fluid : $0 \leq z \leq h + \zeta$

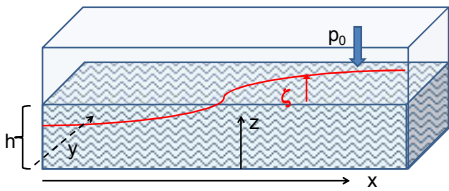
$$-\frac{\partial \Phi}{\partial t} + \frac{1}{2} v^2 + g(z-h) = \text{constant} \quad (\text{We have absorbed } p_0 \text{ in our constant.})$$

$$-\nabla^2 \Phi = 0$$

At surface : $z = h + \zeta$ with $\zeta = \zeta(x, y, t)$

$$\frac{d\zeta}{dt} = \frac{\partial \zeta}{\partial t} + v_x \frac{\partial \zeta}{\partial x} + v_y \frac{\partial \zeta}{\partial y} \quad \text{where } v_{x,y} = v_{x,y}(x, y, h + \zeta, t)$$

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Further simplifications; assume trivial y - dependence

$$\Phi = \Phi(x, z, t) \quad \zeta = \zeta(x, t)$$

Within fluid : $0 \leq z \leq h + \zeta$

At surface : $v_z(x, z = h + \zeta, t) = -\frac{\partial \Phi}{\partial z} = \frac{d\zeta}{dt}$

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Some links:

[Details of soliton equations](#)

[Maple animation](#)

Website – <http://www.ma.hw.ac.uk/solitons/>

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