Numerical Modeling in Geosciences
GEO 325M/398M, Spring 2018

Class details

|	
Class room:	TBD
Class time:	Tu/Th 9:30-11:00pm
Unique:	TBD
Prerequisites:	MATH 427J (ODE's & Matrices), MATH 427 L (∇, $\nabla\cdot$, $\nabla\times$)
	GEO 325G (Matlab)
Description:	The course introduces geoscientists to numerical solution of dynamical problems arising in the solid earth geosciences. The students will develop their own codes in Matlab and apply them to gain insight into heat transfer, wave propagation, elastic and viscous deformations. Familiarity with Matlab is assumed, for an introduction to Matlab please attend GEO 325G.

Instructor

Instructor:	Dr. Marc Hesse
Office:	JGB 4.216G
Office hours:	TBD
Email:	mhesse@jsg.utexas.edu
html:	http://www.jsg.utexas.edu/hesse

Assessment

Grading: The class will be graded based on weekly homeworks.
Collaboration: Students can discuss homeworks, but should write up solutions individually.

Course materials

No textbook is required
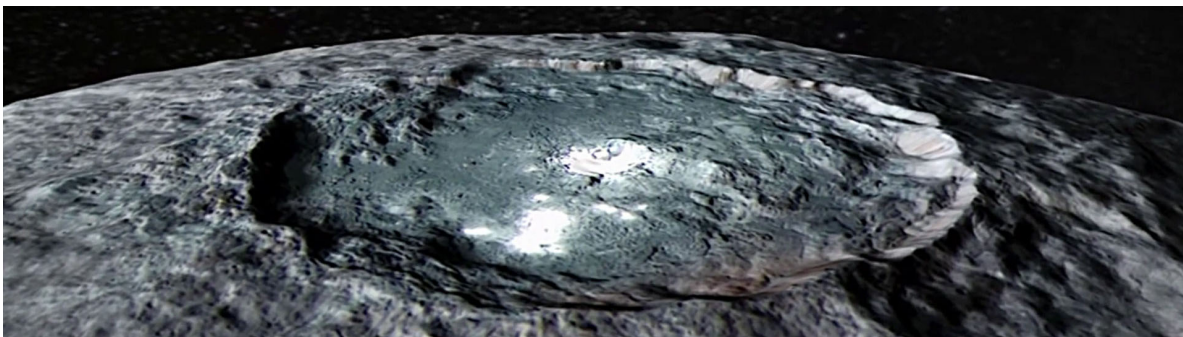
Syllabus

week	dates	lecture	science	matlab	homework
1	18 Jan	1	Introduction to problem	review	
2	23, 25 Jan	2, 3	Conservation laws, phase diagrams	vectorization	HW 1
3	30 Jan, 1 Feb	4, 5	Discrete operators 1D, BC's	sparse linear systems	HW 2
4	6, 8 Feb	6, 7	Timestepping	for-loops, movies	HW 3
5	13, 15 Feb	8, 9	Latent heat and non-linear conduction	while-loops	HW 4
6	20, 22 Feb	10, 11	2D thermal models	tensor products	HW 5
7	27 Feb, 1 Mar	no class	visit to Jet Propulsion Lab		HW 6
8	6, 8 Mar	12, 13	Fluid mass balance and flow		HW 7
9	Mar 13, 15		Spring break		
10	22 Mar	14	Advective transport LPSC	max, min	HW 9
11	27, 29 Mar	15, 16	2D upwind matrices	tensor products	HW 10
12	3, 5 Apr	17, 18	enthalpy method I	coupling	?
13	10, 12 Apr	19, 20	enthalpy method II		?
14	17, 19 Apr	21, 22	TBD		?
15	24, 26 Apr	23, 24	TBD		-
16	1, 3 May	25, 26	TBD		-