

18.354J Nonlinear Dynamics II: Continuum Systems

Spring 2015 – Course Info

Lectures: TR 1-2:30 in E17-136
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1.	T	Feb	3	Introduction, overview & mathematical basics	
2.	R	Feb	5	Dimensional analysis & scalings	
3.	T	Feb	10	Hamiltonian dynamics & Kepler's laws	
4.	R	Feb	12	Random walkers	
—	T	Feb	17	MIT MONDAY (PRESIDENTS DAY)	
5.	R	Feb	19	Diffusion equation: Fourier method	
6.	T	Feb	24	Diffusion equation: Green's function method	
7.	R	Feb	26	Linear stability analysis & pattern formation	PS1 due
8.	T	Mar	3	Calculus of variations	
9.	R	Mar	5	Surface tension	
10.	T	Mar	10	Elasticity	
11.	R	Mar	12	Deformation of a thin beam	PS2 & proposal due
12.	T	Mar	17	Towards hydrodynamics	
13.	R	Mar	19	Navier-Stokes equations I	
—	T	Mar	24	SPRING VACATION	
—	R	Mar	26	SPRING VACATION	
14.	T	Mar	30	Hydrodynamics equations	
15.	R	Apr	2	Stokes limit & Oseen tensor	PS3 due
16.	T	Apr	7	Navier-Stokes equations II	
17.	R	Apr	9	Singular perturbations	
18.	T	Apr	14	Towards airplane flight	PS4 due
19.	R	Apr	16	Euler equations: basic solutions and forces	Mid-term posted
—	T	Apr	20,21	MIT HOLIDAY (PATRIOTS DAY)	
20.	R	Apr	23	2D hydrodynamics	Mid-term due
21.	T	Apr	28	Conformal maps & airfoils	
22.	R	Apr	30	Waves & solitons	
23.	T	May	5	Final projects: student presentations	
24.	R	May	7	Final projects: student presentations	Project report due
25.	T	May	12	Bouncing droplets	
26.	R	May	14	Topological defects & active matter	