
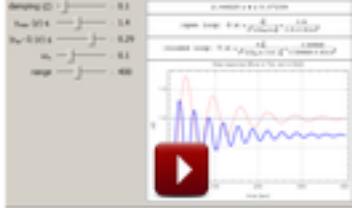
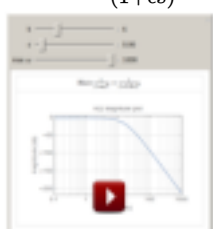
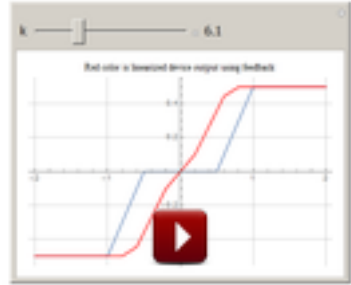
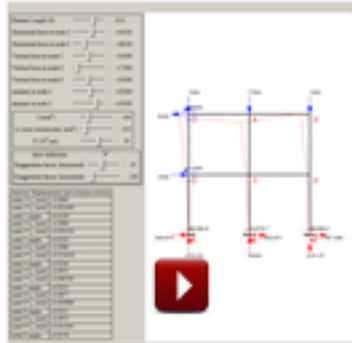



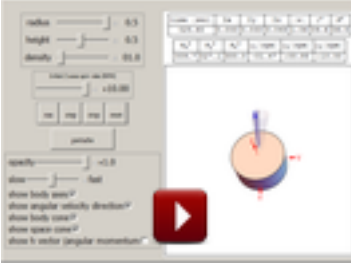

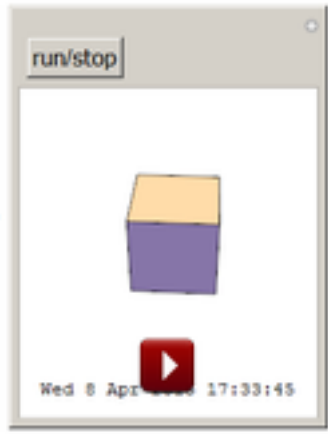
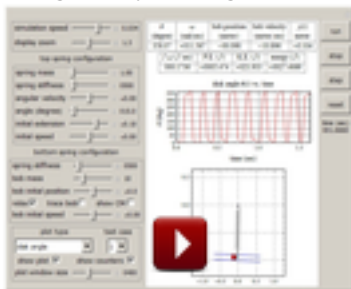
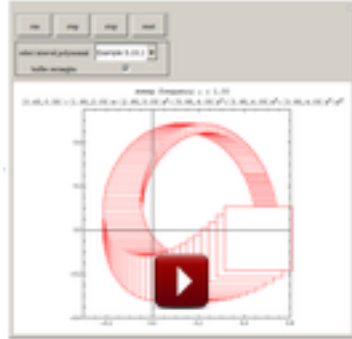
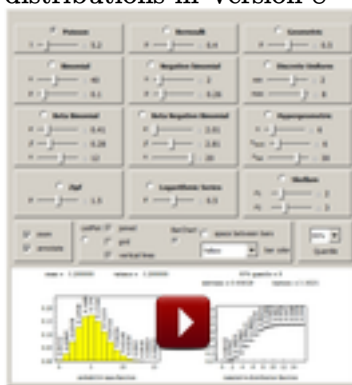
Mathematica Scientific Demonstrations

by Nasser M. Abbasi. Updated May 20, 2020

page compiled on January 31, 2024 at 12:53am

These are Mathematica interactive demonstrations (CDF) I wrote over the last few years. Clicking on the image plays a small movie to illustrate the CDF. Clicking on the link opens a web page that have the CDF file and source code. To play the CDF, download the CDF file to your computer and double click on it to run it using the free Wolfram CDF player

<p>67) Bouncing ball off the ground with different coefficient of restitution</p>  <p>Nov. 1, 2015</p> <p>more...</p> <p>(bouncing_ball/)</p>	<p>66) Design for k using the overshoot design method</p>  <p>Oct. 22, 2015</p> <p>more...</p> <p>(overshoot_design/)</p>	<p>65) Plot of magnitude of low pass filter</p> $H(s) = \frac{1}{(1+\epsilon s)^k}$  <p>Oct. 13, 2015</p> <p>more...</p> <p>(simple_low_pass/)</p>
<p>64) Linearize a plant using feedback</p>  <p>Sept 28, 2015</p> <p>more...</p> <p>(linearize_via_feedback/)</p>	<p>63) Rigid frame using direct stiffness method v.2</p>  <p>June 18, 2015</p> <p>more...</p> <p>(rigid_frame_2/)</p>	<p>62) Rigid frame using direct stiffness method v.1</p>  <p>June 16, 2015</p> <p>more...</p> <p>(simple_rigid_frame/)</p>

<p>61) Body of revolution with zero external moment in body coordinates</p>  <p>June 11, 2015</p> <p>more...</p> <p>(spin_cylinder/)</p>	<p>60) Equation of motion RRR robot arm</p>  <p>April 1, 2015</p> <p>more...</p> <p>(robot_arm_RRR/)</p>	<p>59) Simple example of rotating 3D graphics</p>  <p>April 8, 2015</p> <p>more...</p> <p>(rotate_example/)</p>
<p>58) Double pendulum using heavy spring</p>  <p>January 18, 2015</p> <p>more...</p> <p>(spring_pendulum_type_1/)</p>	<p>57) Kharitonov rectangle for interval polynomial</p>  <p>Nov 28, 2014</p> <p>more...</p> <p>(kharitonov_rectangle/)</p>	<p>56) Illustrating discrete distributions in Version 8</p>  <p>Oct 18, 2014</p> <p>more...</p> <p>(Discrete_Distributions/)</p>

55) Basic use of Radon/Inverse Radon transforms

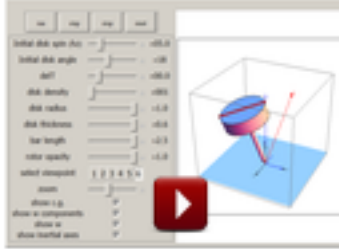


Sept 22, 2014

more...

(simple_radon/)

54) Symmetric top gyroscope motion

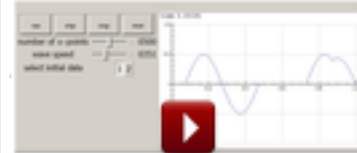


July 15, 2014

more...

(gyroscope_2/)

53) Solving wave equation using leapfrog method



July 5, 2014

more...

(simple_wave_equation/)

52) Precession effect due to wheel spinning



June 29, 2014

more...

(gyroscope_1/)

51) Rotation Stability of spinning cube



June 28, 2014

more...

(spin_cube/)

50) spinning wheel in 3D

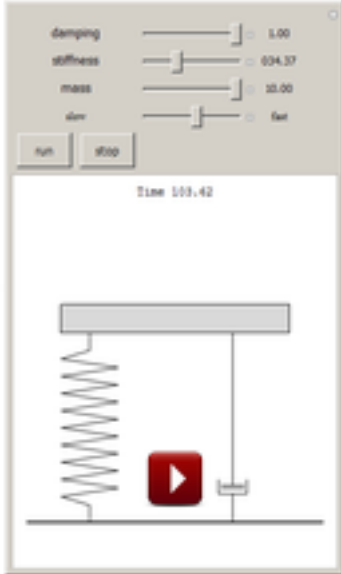


June 29, 2014

more...

(spinning_wheel/)

49) simple
spring-mass-damper

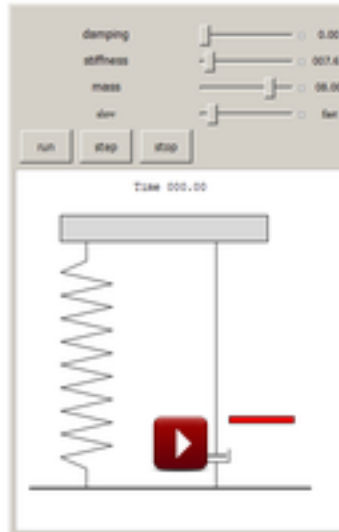


June 19, 2014

more...

(simple_spring_mass_damper/)

48) simple
spring-mass-damper with
stop bar

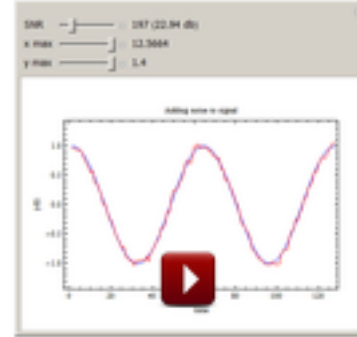


June 19, 2014

more...

(simple_spring_mass_damper_2/)

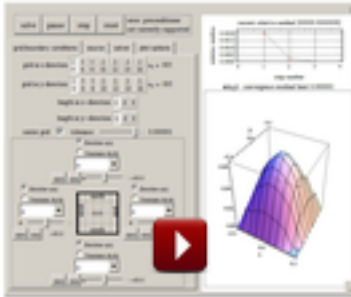
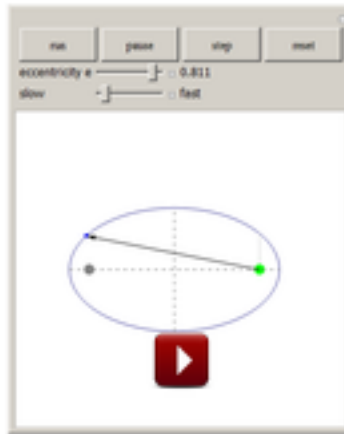


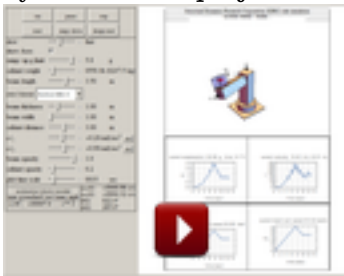
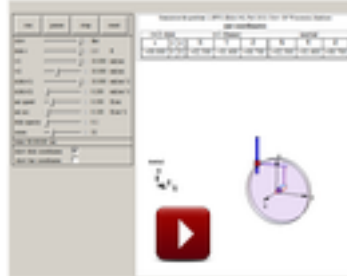
47) Adding Gaussian
noise to signal using SNR
ratio

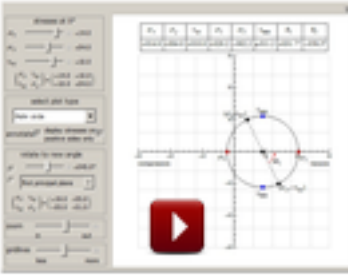

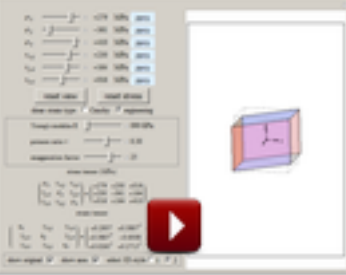
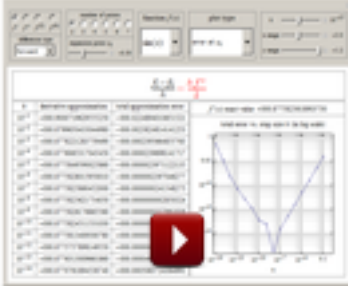
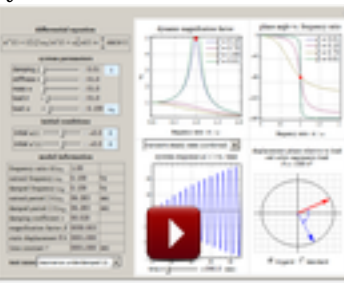
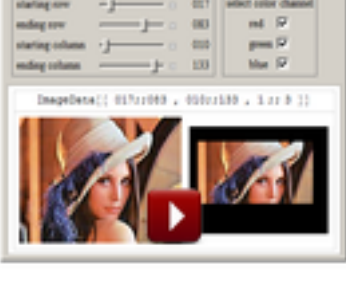


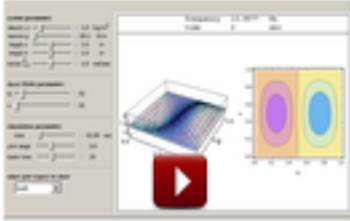


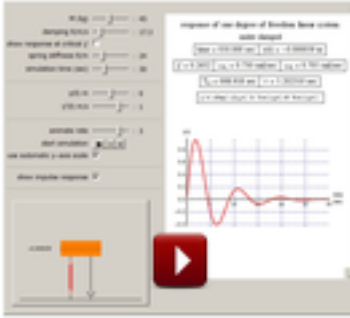
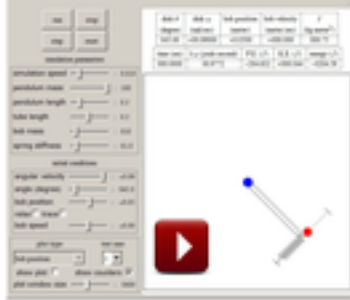
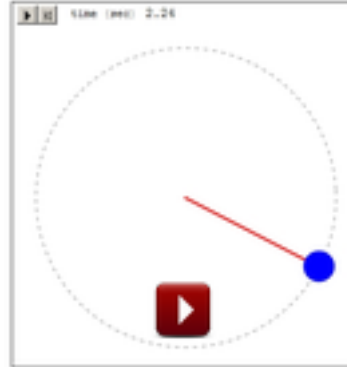
June 21 2014


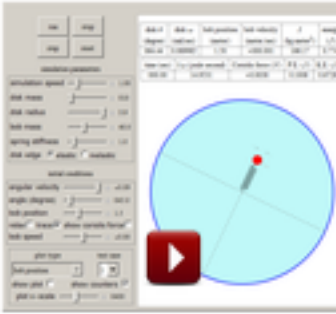
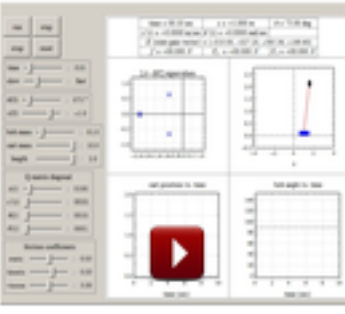
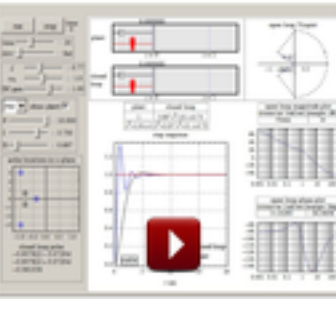
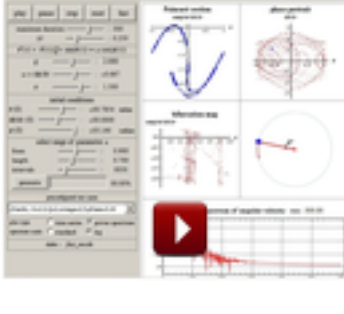
more...

(random_noise/)

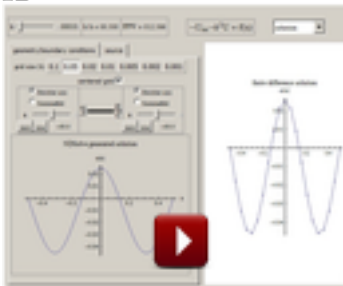
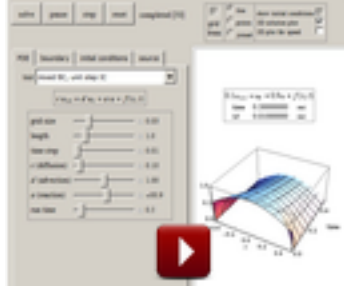
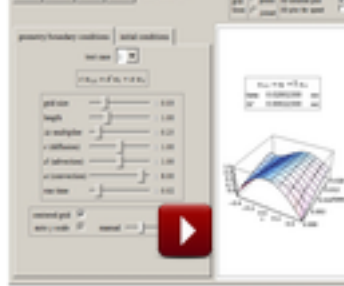
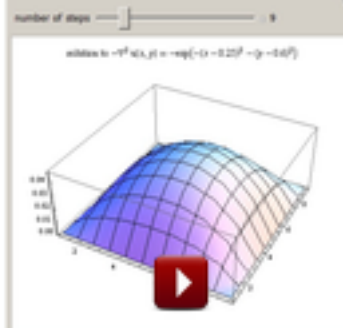
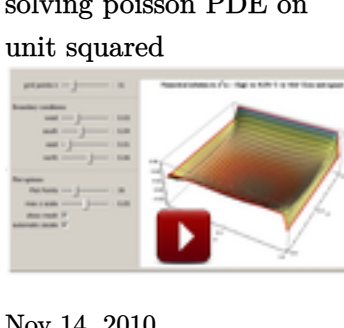
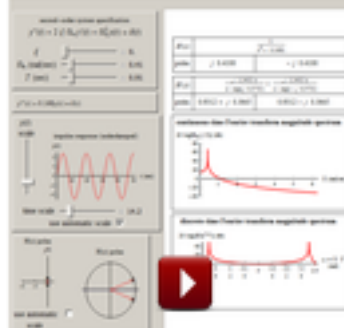
<p>46) Solving 2D Poisson PDE on non-uniform rectangle grid</p>  <p>May 30, 2014</p> <p>more...</p> <p>(poisson_2D/)</p>	<p>45) Elliptical satellite motion demo</p>  <p>January 24, 2014</p> <p>more...</p> <p>(ellipse/)</p>	<p>44) Velocity and acceleration for circular motion</p>  <p>January 4, 2014</p> <p>more...</p> <p>(rotation_demo/)</p>
<p>43) Illustrating discrete distributions in Version 7</p>  <p>December 28, 2013</p> <p>more...</p> <p>(Discrete_Using_Manipulate/)</p>	<p>42) EMA 542 Advanced dynamics final project</p>  <p>Dec 19, 2013</p> <p>more...</p> <p>(EMA542_project/)</p>	<p>41) EMA 542 HW3 problem 1</p>  <p>Dec 19, 2013</p> <p>more...</p> <p>(EMA_542_HW3_problem_1/)</p>

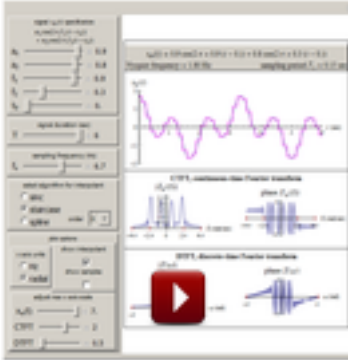
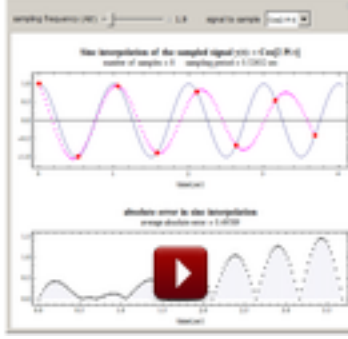
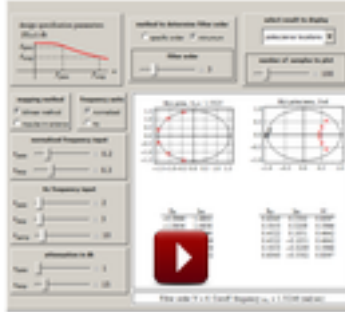
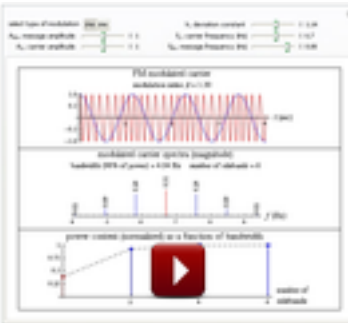
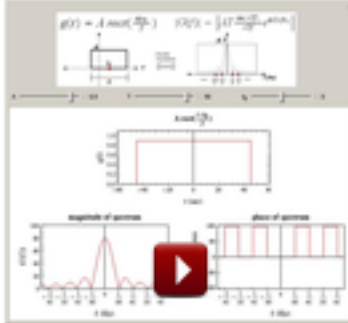
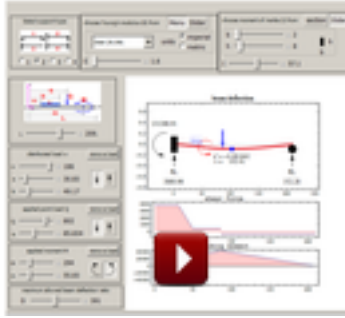
<p>40)Mohr's Circle For Plane Stress</p>  <p>Nov 10, 2013</p> <p>more...</p> <p>(principle_stresses_in_2D/)</p>	<p>39)Three pendulums with two springs</p>  <p>August 16, 2013</p> <p>more...</p> <p>(three_pendulums_with_2_springs/)</p>	<p>38)Direct and Shear Strain Deformation in 3D</p>  <p>sept 7, 2013</p> <p>more...</p> <p>(strain_in_plain_stress/)</p>
<p>37)Finite Difference Formulas Generated By Interpolating Polynomial</p>  <p>August 29, 2013</p> <p>more...</p> <p>(finite_difference/)</p>	<p>36)Vibration analysis of single degree freedom system</p>  <p>August 29 2013</p> <p>more...</p> <p>(single_degree_responses/)</p>	<p>35)ImageData Using Rows And Columns</p>  <p>August 7, 2013</p> <p>more...</p> <p>(image/)</p>

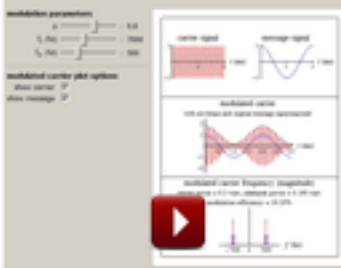
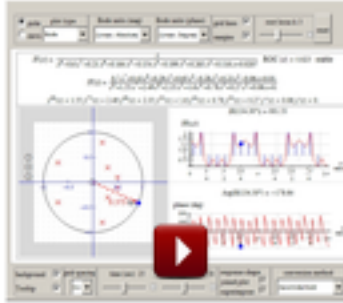
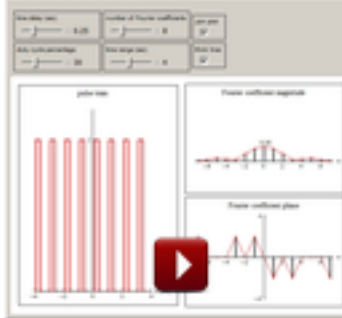
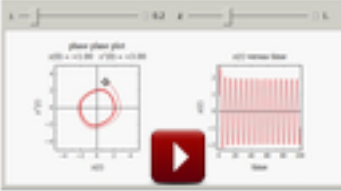
<p>34)2D membrane mode vibration</p>  <p>July 31 2013</p> <p>more...</p> <p>(membrance_2D/simulation/)</p>	<p>33)2 cylinders with 3 springs</p>  <p>July 26,2013</p> <p>more...</p> <p>(two_cylinders_with_3_springs/)</p>	<p>32)Generalized Single Degree Of Freedom for wind tower structure</p>  <p>July 28 2013</p> <p>more...</p> <p>(tower/)</p>
<p>31)Vibration analysis of free response of second order system</p>  <p>July 24 2013</p> <p>more...</p> <p>(unforced_response/)</p>	<p>30)Mass on a spring at end of a solid pendulum</p>  <p>Nov 11, 2012</p> <p>more...</p> <p>(solid_pendulum_with_spring_mass/)</p>	<p>29)Direct dynamics for simulation of pendulum</p>  <p>Nov 10, 2012</p> <p>more...</p> <p>(simple_pendulum_direct/)</p>

<p>28)Posteriori (discrete) particle collision</p>  <p>Sept 25, 2012</p> <p>more...</p> <p>(particle_simulation/)</p>	<p>27)Oscillating Mass On Rotating Table</p>  <p>August 8, 2012</p> <p>more...</p> <p>(slot_on_disk/)</p>	<p>26)Finite element using Ritz method for axial loaded beam</p>  <p>June 2, 2012</p> <p>more...</p> <p>(uniaxial_beam_ritz/)</p>
<p>25)LQR Control of inverted pendulum on moving cart with friction</p>  <p>April 16, 2012</p> <p>more...</p> <p>(inverted_pendulum/)</p>	<p>24)PID controller design for second order system</p>  <p>Feb 2, 2012</p> <p>more...</p> <p>(PID/)</p>	<p>23)Chaotic motion of damped driven pendulum</p>  <p>September 2, 2011</p> <p>more...</p> <p>(simple_pendulum_damped_driven/)</p>

<p>22) Triple pendulum with damping</p>  <p>September 1, 2011</p> <p>more...</p> <p>(double_pendulum/)</p>	<p>21) Computed tomography using Radon Transform (v.1)</p>  <p>July 5, 2011</p> <p>more...</p> <p>(CT_sweep/)</p>	<p>20) Computed tomography using Radon Transform (v.2)</p>  <p>July 4, 2011</p> <p>more...</p> <p>(CT/)</p>
<p>19) Rigid body disk pendulum rotating on moving table</p>  <p>June 25, 2011</p> <p>more...</p> <p>(pendulum_on_moving_table/)</p>	<p>18) Rigid body pendulum on a flywheel</p>  <p>June 8, 2011</p> <p>more...</p> <p>(pendulum_flywheel/)</p>	<p>17) Finite difference for solving Helmholtz differential equation in 2D</p>  <p>Feb 2, 2012</p> <p>more...</p> <p>(Helmholtz_2D/)</p>

<p>16) Finite difference for solving Helmholtz differential equation in 1D</p> 	<p>15) Finite difference solution for diffusion-advection-reaction (heat) in 1D</p> 	<p>14) Finite difference solution of the diffusion-convection in 1D</p> 
<p>March 6, 2012</p> <p>more...</p> <p>(Helmholtz_1D/)</p>	<p>Feb 20, 2012</p> <p>more...</p> <p>(diffusion_advection_reaction_1D/)</p>	<p>Feb 10, 2012</p> <p>more...</p> <p>(diffusion_convection_1D/)</p>
<p>13) Minimal example to solve Poisson 2D using Jacobi method</p> 	<p>12) Finite difference for solving poisson PDE on unit squared</p> 	<p>11) Analog-to-discrete system conversion using impulse invariance</p> 
<p>March 6, 2012</p> <p>more...</p> <p>(jacobi_2d/)</p>	<p>Nov 14, 2010</p> <p>more...</p> <p>(poisson2DSolver/)</p>	<p>May 3, 2010</p> <p>more...</p> <p>(filter/)</p>

<p>10) Continuous Time Fourier Transform to Discrete Time by Sampling</p>  <p>April 7 2010</p> <p>more...</p> <p>(DTFT_demo/)</p>	<p>9) Sinc interpolation</p>  <p>Feb 18 2010</p> <p>more...</p> <p>(sinc_interpolat/)</p>	<p>8) IIR digital low-pass Filter Design by Butterworth method</p>  <p>Sept 25, 2010</p> <p>more...</p> <p>(IIR_design/)</p>
<p>7) Power content of frequency modulation and phase modulation</p>  <p>September 6 2009</p> <p>more...</p> <p>(FM_simulation/)</p>	<p>6) Rectangular pulse and its Fourier transform</p>  <p>December 27 2009</p> <p>more...</p> <p>(sinc_rect/)</p>	<p>5) Single span Euler Bernoulli beam</p>  <p>Oct 21 2009</p> <p>more...</p> <p>(euler_beam_demo/)</p>

<p>4) Power efficiency of amplitude modulation</p>  <p>August 31 2009</p> <p>more...</p> <p>(AM_simulation/)</p>	<p>3) Design a digital filter using locations of poles and zeros</p>  <p>April 13 2009</p> <p>more...</p> <p>(pole_zero/)</p>	<p>2) Fourier series coefficients of a rectangular pulse signal</p>  <p>April 12 2009</p> <p>more...</p> <p>(rect_train/)</p>
<p>1) Van der Pol differential equation</p>  <p>April 11 2009</p> <p>more...</p> <p>(vanderpol/)</p>		