


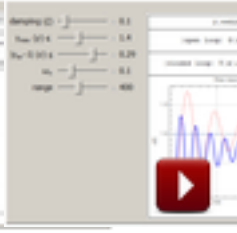
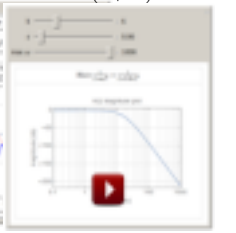
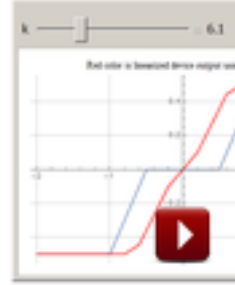
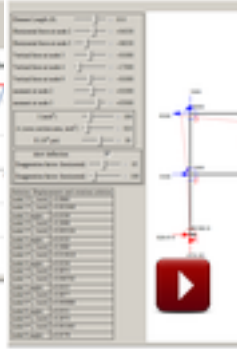
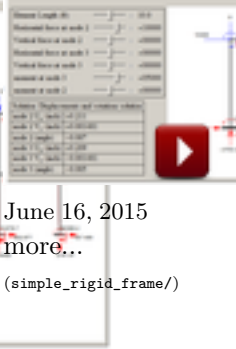
## Mathematica Scientific Demonstrations

by Nasser

M. Abbasi. Updated October 22, 2015

page compiled on Wednesday 6<sup>th</sup> July, 2016 at 21:57

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

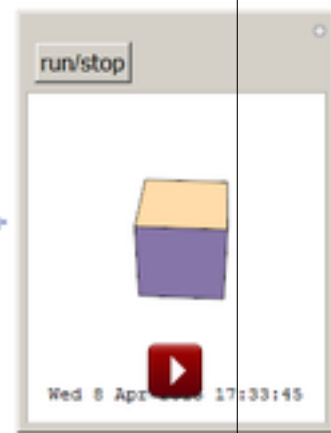
(61) Body of revolution with zero external moment in body coordinate  
 (60) Equation of motion for RRR robot arm  
 (59) Simple example of rotating 3D graphics



June 11, 2015  
 more...  
 (spin\_cylinder/)



April 1, 2015  
 more...  
 (robot\_arm\_RRR/)



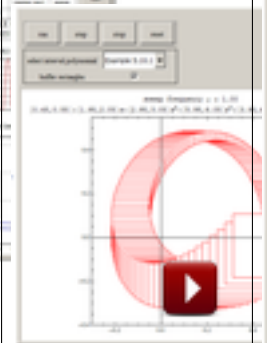
April 8, 2015  
 more...  
 (rotate\_example/)

(58) Double pendulum using heavy spring



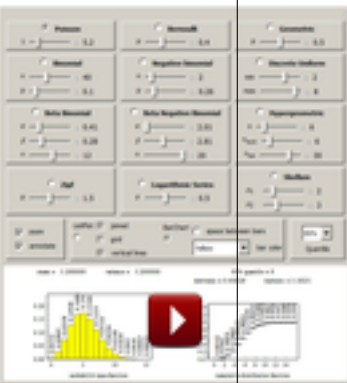
January 18, 2015  
 more...  
 (spring\_pendulum\_type\_1/)

(57) Kharitonov rectangle for interval polynomial



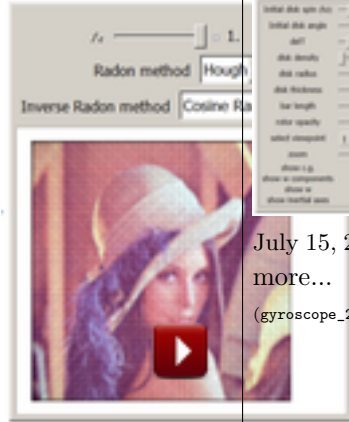
Nov 28, 2014  
 more...  
 (kharitonov\_rectangle/)

(56) Illustrating discrete distributions in Version 8

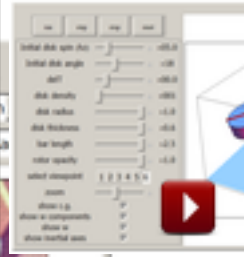


Oct 18, 2014  
 more...  
 (Discrete\_Distributions/)

(55) Basic use of Radon/Inverse Radon transforms



(54) Symmetric gyroscope motion



July 15, 2014  
more...  
(gyroscope\_2/)

(53) Solving wave equation using leapfrog method



July 5, 2014  
more...  
(simple\_wave\_equation/)

Sept 22, 2014  
more...  
(simple\_radon/)

(52) Precession effect to wheel spinning



June 29, 2014  
more...  
(gyroscope\_1/)

(51) Rotation Stability spinning cube



June 28, 2014  
more...  
(spin\_cube/)

(50) spinning wheel in 3D



June 29, 2014  
more...  
(spinning\_wheel/)

(49) simple spring-mass damper (48) simple spring-mass damper with stop bar noise to signal using SNR ratio

June 19, 2014  
more...  
(simple\_spring\_mass\_damper/)

June 19, 2014  
more...  
(simple\_spring\_mass\_damper\_2/)








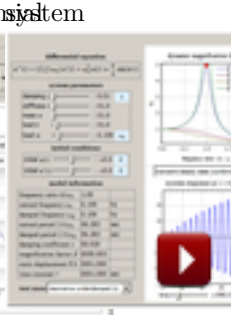
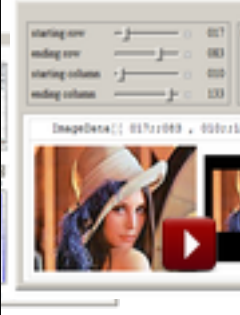
June 21 2014  
more...  
(random\_noise/)

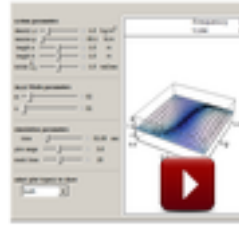




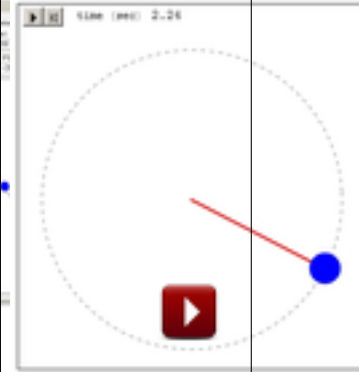
(46) Solving 2D Poisson PDE on non-uniform rectangle grid (45) Elliptical satellite motion demo (44) Velocity and acceleration for circular motion


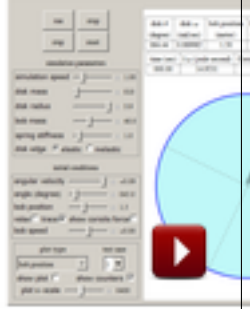


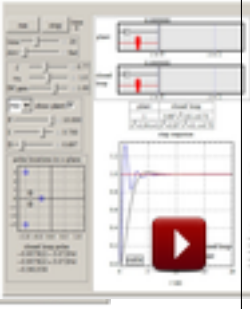
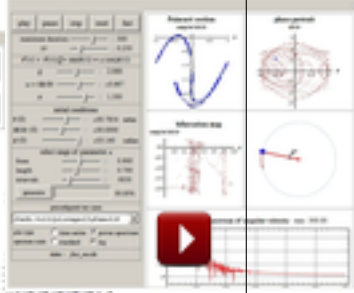
May 30, 2014  
more...  
(poisson\_2D/)

January 24, 2014  
more...  
(ellipse/)

January 4 2014  
more...  
(rotation\_demo/)

<p>(43) Illustrating discrete distributions in Version 7</p>  <p>December 28, 2013 more... (Discrete_Using_Manipulate/)</p>	<p>(42) EMA 542 Advanced dynamics final project</p>  <p>Dec 19, 2013 more... (EMA542_project/)</p>	<p>(41) EMA 542 HW3</p>  <p>Dec 19, 2013 more... (EMA_542_HW3_problem_1/)</p>	
<p>(40) Mohr's Circle Plane Stress</p>  <p>Nov 10, 2013 more... (principle_stresses_in_2D/)</p>	<p>(39) Three pendulums with two springs</p>  <p>August 16, 2013 more... (three_pendulums_with_2_springs/)</p>	<p>(38) Direct and Shear Strain Deformation in 3D</p>  <p>sept 7, 2013 more... (strain_in_plain_stress/)</p>	
<p>(37) Finite Difference Formulas Generated by Interpolating Polynomials</p>  <p>August 29, 2013 more... (finite_difference/)</p>	<p>(36) Vibration analysis of single degree freedom system</p>  <p>August 29 2013 more... (single_degree_responses/)</p>	<p>(35) ImageData Using Rows And Columns</p>  <p>August 7, 2013 more... (image/)</p>	

<p>(34) 2D membrane membrane vibration</p>  <p>July 31 2013 more... (membrane_2D/simulation/)</p>	<p>(33) 2 cylinders with 3 springs</p>  <p>July 26, 2013 more... (two_cylinders_with_3_springs/)</p>	<p>(32) Generalized Single Degree Of Freedom for wind tower structure</p>  <p>July 28 2013 more... (tower/)</p>
<p>(31) Vibration analysis of free response of second order system</p>  <p>July 24 2013 more... (unforced_response/)</p>	<p>(30) Mass on a spring</p>  <p>Nov 11, 2012 more... (solid_pendulum_with_spring_mass/)</p>	<p>(29) Direct dynamics simulation of pendulum</p>  <p>Nov 10, 2012 more... (simple_pendulum_direct/)</p>

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

(22) Triple pendulum with damping



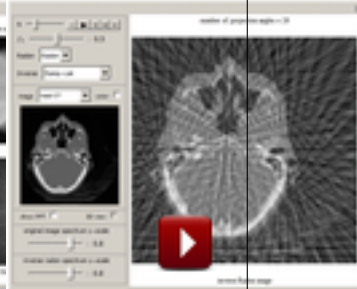
September 1, 2011  
more...  
(double\_pendulum/)

(21) Computed tomography using Radon Transform (v.1)



July 5, 2011  
more...  
(CT\_sweep/)

(20) Computed tomography using Radon Transform (v.2)



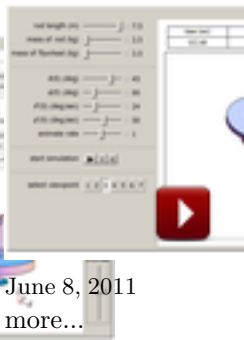
July 4, 2011  
more...  
(CT/)

(19) Rigid body pendulum rotating on a moving table



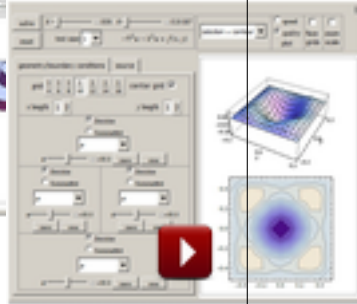
June 25, 2011  
more...  
(pendulum\_on\_moving\_table/)

(18) Rigid body pendulum on a flywheel



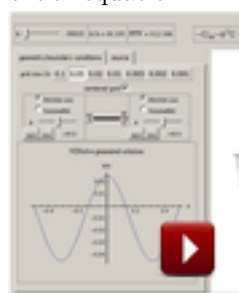

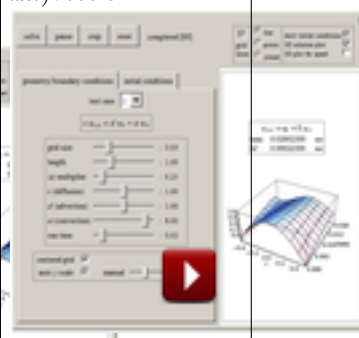
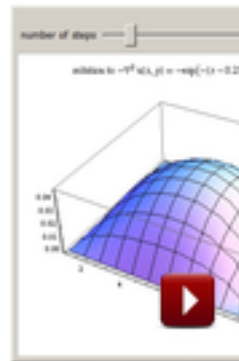
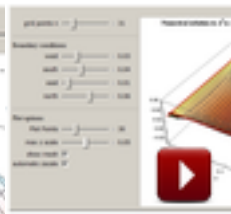

June 8, 2011  
more...  
(pendulum\_flywheel/)

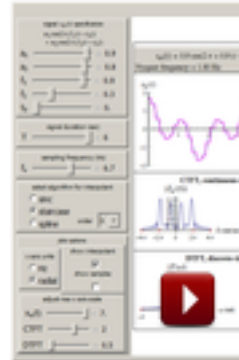
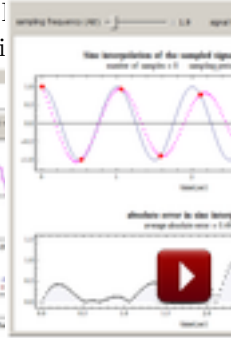
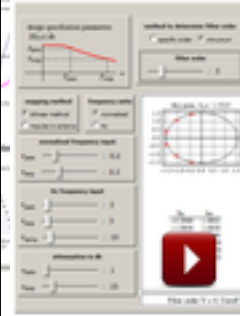
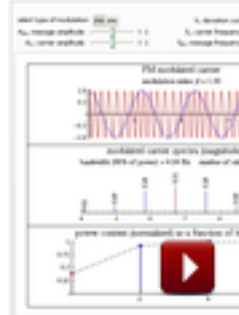
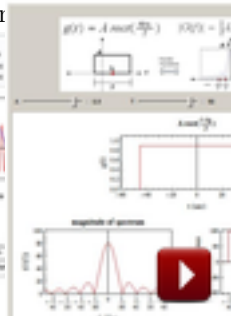
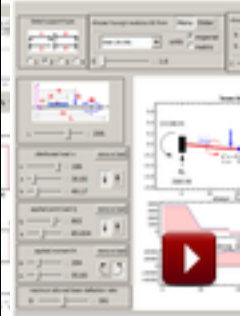
(17) Finite difference for solving Helmholtz differential equation in 2D



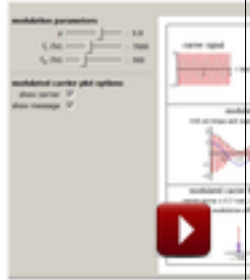
Feb 2, 2012  
more...  
(Helmholtz\_2D/)



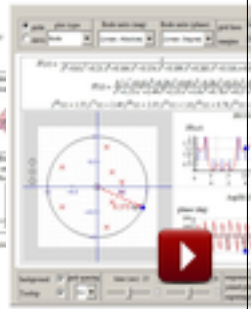
<p>(16) Finite difference solving Helmholtz differential equation in 1D</p>  <p>March 6, 2012 more... (Helmholtz_1D/)</p>	<p>(15) Finite difference solution for diffusion-advection-reaction (heat) in 1D</p>  <p>Feb 20, 2012 more... (diffusion_advection_reaction_1D/)</p>	<p>(14) Finite difference solution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

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

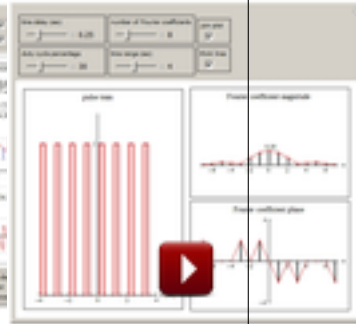
(4) Power efficiency of amplitude modulation  
 (3) Design a digital filter using locations of poles and zeros  
 (2) Fourier series coefficients of a rectangular pulse signal



August 31 2009  
 more...  
 (AM\_simulation/)



April 13 2009  
 more...  
 (pole\_zero/)



April 12 2009  
 more...  
 (rect\_train/)

(1) Van der Pol differential equation



April 11 2009  
 more...  
 (vanderpol/)