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### • More student accessible demonstrations and mathematics on gravitational radiation

physicsfromplanetearth.wordpress.com/
tinyurl.com/WS-GWspandex
tinyurl.com/WS-spandex1
tinyurl.com/WS-spandex2
ptsos.org/

***Physics from Planet Earth*** is the title of a newly published "one semester calculus-based introduction to classical mechanics, intended for first-year college/university students studying physics, astronomy, chemistry or engineering" textbook by Amato and Galvez that features examples drawn from astronomy, cosmology, and space science. Some of these examples are presented and discussed in author Joe Amato's blog of the same name, and the blog is compelling. I like to include real world exciting problems in my own instruction (students like these, though the research takes me a long time) and the site has several examples I will appropriate (with citation), as well as timely posts dedicated to gravitational radiation that present problems I would not hesitate to use with a junior-level mechanics course. (*Submitted by Joe Amato of Colgate University Physics)*

Steve Mould (and others) are doing a very nice conceptual analogic demonstration of gravity waves on a Lycra-spandex sheet using a pair of furniture wheels driven by a hand drill. Slow-speed video playback shows the ripples propagating through the spandex in a very thought-provoking manner. This new demo is a nice extension of the "spandex" gravity demos promoted by Dan Burns including his helpful manufacturing video with parts list to made your own "big bass drum" device. Also, check out Burns' PTSOS site affiliated with NCNAAPT and support Northern California and Nevada physics teachers.

### • Desmos: A free cross platform calculating and graphing tool

student.desmos.com/?prepopulateCode=p8rk
desmos.com
student.desmos.com
teacher.desmos.com

Several physics teachers have in the past directed me to the free online cross platform graphing and calculating tool called **Desmos**, which I find somewhat reminiscent of Vernier's Graphical Analysis ported into Mathematica notebooks. These teachers mainly used Desmos to generate particular plots and/or manipulate related equations in their instruction (particularly by using "sliders") or to fit equations to and from photographs. Recently Michael Magnuson, calculus and physics teacher at Canisius HS, took time to create a simple Desmos tutorial for teachers detailing how he uses the software to teach AP Physics. Michael introduces his tutorial thus: "Desmos will graph functions, plot tables of data, evaluate equations, explore transformations, and much more—for free! It is an iPad app, an Android app, and a web-based app. It is a substitute for expensive graphing calculators, with a more intuitive interface. You can use it as a stand-alone program, or in a guided environment like this, or you can embed it in an ebook." His short tutorial is well worth exploring if you are looking for a software tool for readily solving and sharing physics problems with your students. Magnuson also shows teacher overview tools and a nice trigonometric example.

*Submitted by Michael A. Magnuson of Canisius HS Science*

### • Climate change visualizations

tinyurl.com/WS-CC1
www.giss.nasa.gov/research/
data.giss.nasa.gov/gistemp/
xkcd.com/1732/

This past summer I noticed remarkable summer temperatures here in upstate New York – the highest in 136 years of record keeping. There were a number of striking online climate data visualization postings this past year, starting with National Aeronautics and Space Administration (NASA), Goddard Institute for Space Studies, "NASA Analysis Finds July 2016 is Warmest on Record," http://data.giss.nasa.gov/gistemp/news/20160816/. Kudos to the NASA Goddard ESD folk. We really are in uncharted waters, and should vote and comport ourselves accordingly—as a species we need to seriously change our actions and stop digging ourselves into a deeper fossil fuel hole. Randall Munroe's excellent xkcd.com series sets the context for the scale of these temperature changes within the past 22,000 years of human experience.

*Commented and submitted to PHYS-L by Dan MacIsaac, David Marx, and John S Denker*

### •A New Gravity Simulator

www3.sympatico.ca/michael.enns/
newsletter.oapt.ca/files/Browser-based-Gravitational-Simulator.html#unique-entry-id-104
phet.colorado.edu/en/simulation/legacy/gravity-and-orbits

It's nice to see a new in-browser gravitation/solar system simulator developed by Michael Enns of the OAPT—see his OAPT newsletter article for detailed instructions. And it runs on my iPad and phone both!