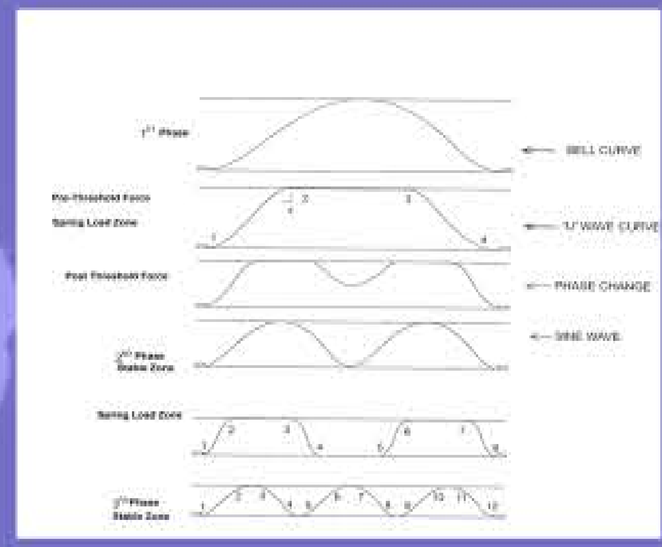
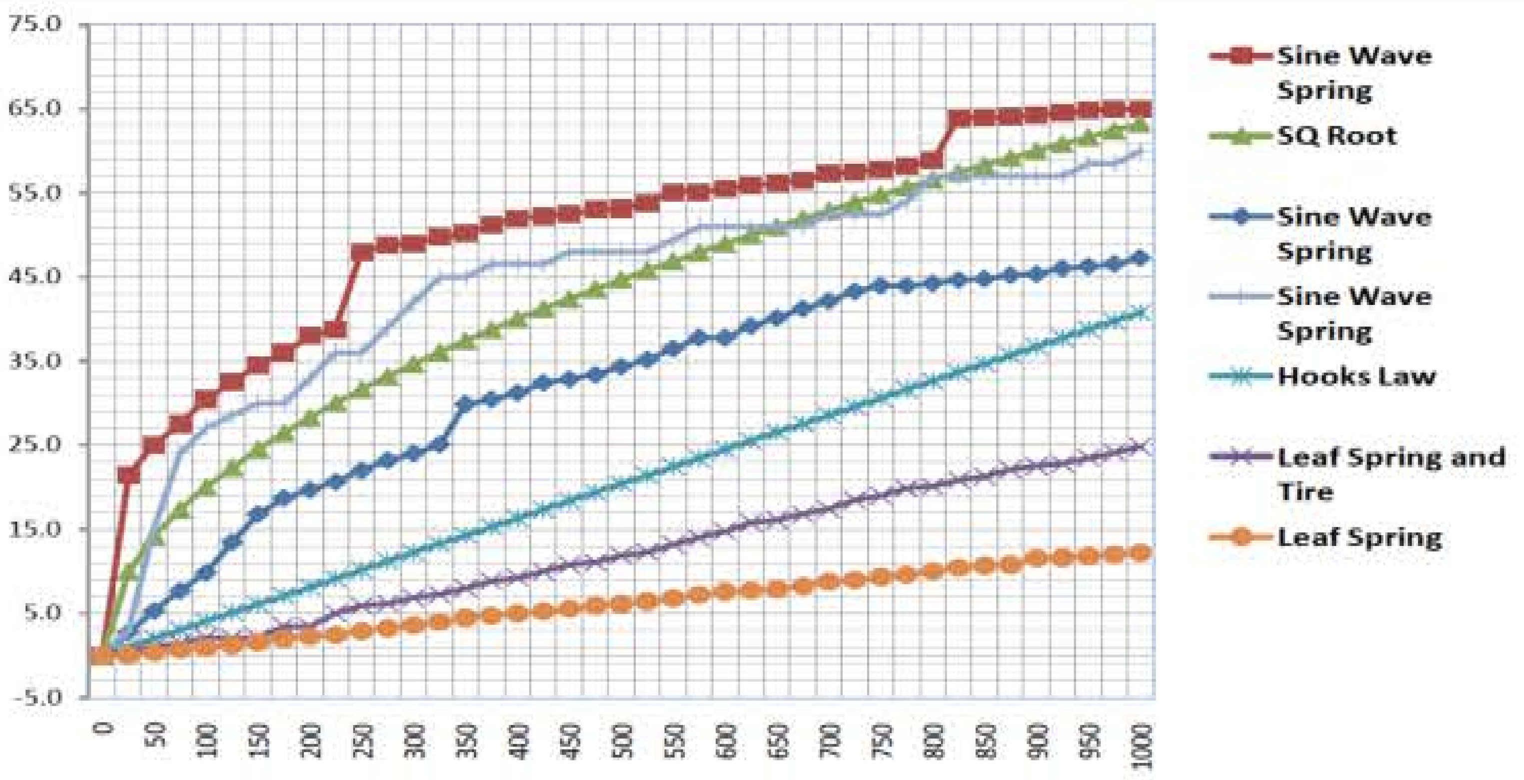
Have You Stressed Your BELL CURVE Today?



CONCEPT: This process models a random system being converted to an ordered system by the application of effort.



Load Test results of a Sine Wave Spring as compared to the performance of a normal leaf spring and tire. The graph shows the superior low and high end performance of the sine wave spring. Baseline projections are shown by the "SQ Root" and "Hooks Law" line for the two types of springs.

Abstract of the Effect

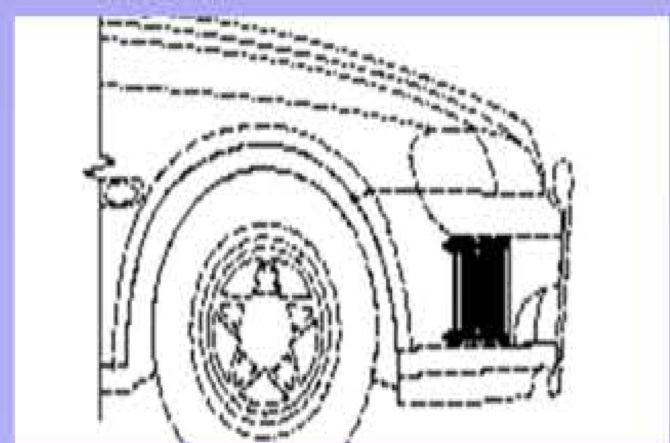
A mechanical sine wave system is formed from a relatively thin sheet of spring material which is constructed by constricting the material and holding the ends to form a bell curve. The bell curve is positioned between two compressive members. A compressive force is then applied in a downward direction. The bell curve is compressed and shifts to form the relatively low frequency sine wave. As the force increases, the system shifts to a higher frequency wave with matching lower amplitude. For materials, this effect continues till the radius of the wave becomes prohibitively small, and the yield strength of the material is passed. If the force is removed prior to the material's yield point, the flexible material will return to its original shape. The force needed to shift the sine wave to the higher frequency increases at an exponential rate, as opposed to the linear rate as described by Hook's law (shown in graph). The threshold force needed to convert a low frequency wave to a higher frequency is much greater than the force required to maintain the new wave in its new stable state. This is the root of the energy absorbing / self-dampening effect of the sine wave spring used in a mechanical system.

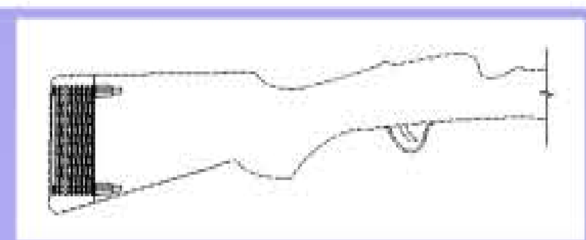
ACTION: Can you envision another system that this effect models? i.e. Statistic, Analytic, Demographic, Electrical, Chemical, Physical, Biological, Optical, Quantum Mechanics, etc

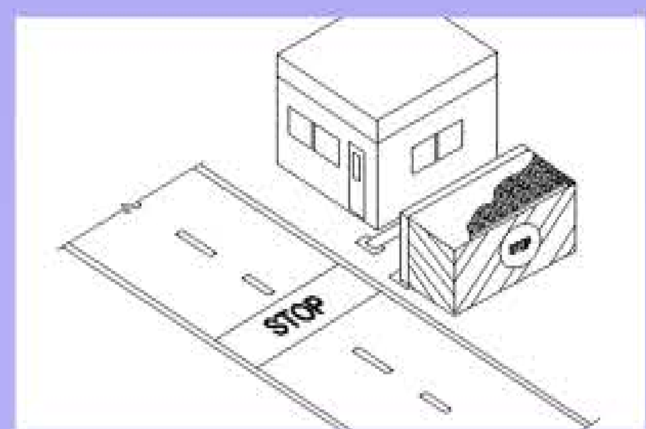
ACTION: How can you stress your random data field or system to produce an ordered system?

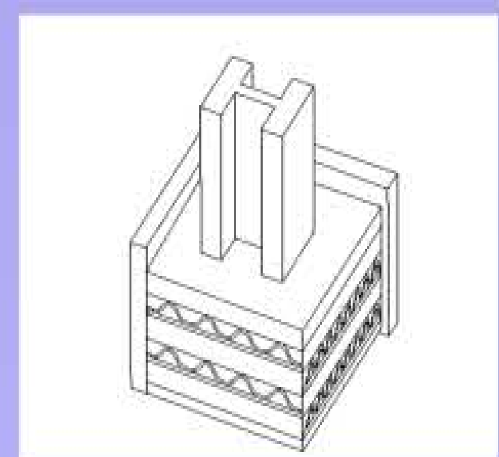
Such a relatively small, light-weight energy absorbing system with an exponential stress / strain rate and energy absorbing / self dampening effect, through phase change, could have a number of useful mechanical applications.

- Shown below is an airfoil segment of unidirectional carbon fiber prior to being cut axially for ribs as well as ribs and spars of a composite wing produced using the compressive technique.
- Sine wave spring as installed on a trailer for performance and load testing.
- The effect has been used to produce light-weight / high-strength impact resistant trusses and panels made of composite materials for aerospace applications.
- Energy absorbing bumper system and crash attenuation barriers are shown. Possible applications are being shown used for highway safety and structural protection.
- Civil engineered structures could benefit from the spring's exponential load range. Its applications would be in the flexible beam and column connections in buildings and bridges to mitigate seismic events.
- Military applications could be in the form of recoil reduction systems and personnel protection.









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