University at Buffalo
Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences

ENGINEERING SEMINAR

A New Mechanics Theory: Mechano-Thermodynamics

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Abstract

The field of classical mechanics is based on Sir Isaac Newton's work in "The Principia," published in 1687. In this work, Newton introduced the world to three universal laws of motion, which describe the relationships of any object, the forces acting upon it and the object's resulting motion. It is these three laws that make up the foundation for classical mechanics, and all subsequent theories of mechanics are derived from them. But Newtonian mechanics still cannot account for the past, present or future of any aspect of a physical body or its governing equations.

Around 1850, Rudolf Clausius and William Thomson (Kelvin) formulated both the First and Second Laws of Thermodynamics. Because the field of thermodynamics governs the past, present and future of all physical bodies, the aging process and life span of any physical body can be modeled in accordance with the thermodynamics laws. Still, thermodynamics alone cannot convey the response of a physical body under an external force at any given moment – something classical mechanics equations are able to achieve.

Being able to accurately predict the life span of physical bodies, both living and non-living, has been one of humankind's eternal endeavors. Over the last 150 years, many unsuccessful attempts were made to unify the fields of classical mechanics and thermodynamics, in order to create a generalized and consistent theory of evolution of life-span of inorganic and organic systems. The objective has been to map out the aging process of a physical body using classical mechanics equilibrium equations while also predicting its life span. Most past attempts were based solely on the use of physical experiments, which would reveal the aging rate and life span of any physical body first. The experimental data is later be used to create a life-span expectancy model by curve fitting.

Professor Basaran, will report a new unified mechanics theory that can now predict the aging and life span of any physical body based purely on mathematical calculations and without the need for any prior life-span degradation testing or curve fitting phenomenological damage mechanics models.

Date: Friday, September 22th, 2017 Time: 11.00 am-12:00 pm
Location: 140 Ketter Hall, North Campus, University at Buffalo