Victor Zayas, PhD, Earthquake Engineer

Hall of Fame Member, American Society of Civil Engineers

Lifetime Achievement Award Winner
Structural Engineers Association of California

Academy of Distinguished Alumni,
University of California, Berkeley

Senior Research Fellow, University of California, Berkeley

Doctorate in Structural Earthquake Engineering,
University of California, Berkeley

President and Founder, Earthquake Protection Systems

Inventor of Pendulum Seismic Isolators

California Professional Engineer C35723

Dr. Zayas' PhD thesis work was elected to an ASCE Hall of Fame for: *"Pioneering Innovation and Lasting Impact"*. The Structural Engineers Association of California awarded Victor their *"Lifetime Achievement Award"* stating: *"Victor Zayas has changed the practice of structural engineering for the better"*. Dr. Zayas is an inaugural member of the Academy of Distinguished Alumni, of the University of California Berkeley, Civil Engineering Department. Victor is the inventor of pendulum seismic isolators, and founder and president of Earthquake Protection Systems California, "EPS". Structure Engineer Magazine cover story cites *"Victor Zayas: Steady Innovation"*. *"Zayas embodies the entrepreneurial spirit while also helping to invent and shape how engineering can continue to improve."* https://goo.gl/b1drt8
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Dr. Zayas' PhD concept for ductile structures, as developed while doing his thesis work at the University of California Berkeley during the 1970s, was to increase a structure's lateral displacement capacity by developing ductile structure member details that would distribute seismic displacements throughout the entire structure height, and avoid thus concentrations of displacements in any one portion of a structure, which typically is the primary cause of structure collapse. This "ductile structure" approach achieves structures that allow large inelastic structural deformations that avoid collapse during strong earthquakes. Victor's thesis contributed to the development of modern seismic codes that avoid collapse for buildings, bridges, and industrial facilities, which have saved millions of lives worldwide. However, Dr. Zayas was not satisfied with the severe damage that occurs with the ductile structures designed by code using "R Factors". These ductile structures suffer more damage than the older structure types that were designed simply for higher seismic shear strengths.

In 1979 Victor started to develop a structure type that would maintain post-earthquake functionality. This started his 40 years of developments on pendulum seismic isolators, displacement based seismic design, isolated structure construction methods, earthquake shaking damage estimations, isolator materials that would deliver reliably consistent properties when subject to adverse environmental conditions for 50 years, and this SISC standard for seismic isolators. Damage is avoided, and safety is assured, by reliably absorbing the seismic displacements in sliding pendulum isolators; thus minimizing the accelerations, forces, and lateral displacements occurring in the other structural members. Victor's pendulum isolators actively control a structure's period, damping, and displacement capacity, instead of passively accepting the periods, yielding, unknown safe inelastic displacement capacity, and the high accelerations and forces, and the severe damage that occurs in ductile structures. In structures compliant with the Seismic Isolation Standard for Continued Functionality (SISCF), the structural members remain reliably elastic, and ductile detailing is not required. Damage is avoided, and structures are constructed faster and at lower costs, as compared to the ductile structure types specified in the building codes.

Today, Dr. Zayas is the world's leading engineer implementing seismic isolators to minimize damage sufficiently to maintain functionality. Victor's pendulum isolators have been installed in over $350 Billion in constructed value of important buildings, bridges, and industrial facilities, in 32 countries. For 30 years, Victor has advocated that the structure design codes should require isolated structures to be designed with R=1 and drifts less than 0.3%. Such isolated structures serve a much needed structure type to minimizes damage as required for essential facilities. To date, no structure design code has implemented these resiliency criteria. Consequentially, most isolated buildings have been constructed as the lowest cost isolated structure permitted by the codes, which typically has been flexible moment frames supported on rigid rubber isolators. These structures have reduced design shear strengths because of the seismic isolators, but for the design basis earthquakes most of the installed rubber isolators have stiffness much higher than the code assumed "effective stiffness" which is based on MCE displacements. These flexible moment frame structures supported on rigid isolators suffer more damage and have higher probabilities of collapse as compared to traditional ductile structures, and certainly do not deliver the Continued Functionality performance expected by owners.