The Richard J. Carroll Memorial Lectureship was established at The Johns Hopkins University to commemorate one of Baltimore’s leading structural engineers, Richard J. Carroll, P.E. The lectureship was endowed by the many friends and admirers of Mr. Carroll, who passed away in 1982. The endowment contributes to the ongoing guest seminars in the Department of Civil Engineering and provides for these special lectures.

Richard J. Carroll, P.E. received his bachelor of civil engineering degree from Villanova University in 1955 and studied advanced structural design at The Johns Hopkins University and George Washington University. He was chief structural engineer for the firms of Knoerle, Bender, Stone, and Associates, and Ewell, Bomhardt and Associates and chief field engineer for the Portland Cement Association. In 1964 he founded his own firm, Carroll Engineering, Inc., which grew to 26 employees under his leadership. Mr. Carroll made contributions to the civil engineering profession through his membership in numerous professional societies and he published several papers on concrete use and design with an emphasis on post-tensioned and pre-stressed concrete. He also taught courses in ultimate strength design and plastic design in steel. His untimely death at the age of 49 left a legacy of professionalism, integrity, and vigor.

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Fracture of Steel Structures: from microns to meters

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M.T. Geoffrey Yeh Endowed Chair of Civil Engineering, Professor Emeritus
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A native of Memphis, TN, Professor Dodds earned a BS in Civil Engineering at the University of Memphis and a MS, PhD in Civil Engineering at the University of Illinois.

His research focuses on fatigue and fracture of structural metals and new, advanced materials.

In recognition of his research contributions at the University of Illinois, Professor Dodds was named the first holder of the Nathan M. Newmark Endowed Professorship and later the M.T. Geoffrey Yeh Endowed Chair in Civil Engineering.

His research awards include the Walter L. Huber Prize from ASCE, the Nathan M. Newmark Medal from ASCE, elected Fellow of the ASTM, and the George Irwin Medal from the ASTM.

He was elected to the U.S. National Academy of Engineering in 2008.

He served 5 years as Head of the Department of Civil & Environmental Engineering at Illinois from 2004-2009.

Upon retiring from Illinois in 2012, Prof. Dodds moved to the Knoxville area where he holds a partial appointment in the CEE Department and maintains an active research program, consults with government agencies and laboratories and contributes to engineering professional societies.
Ferritic steels constitute much of the existing and planned built infrastructure worldwide. The affordable cost and widespread availability combined with continuing improvements in strength, fracture, fatigue and corrosion properties make steel ubiquitous for the construction of high-performance structures including long-span bridges, pipelines, pressure vessels, turbines, offshore platforms, ships, submarines and key components in aerospace vehicles. Yet, despite a half-century of progress in understanding the fracture behavior of steels, challenging research and practical issues remain unresolved. The fracture process that triggers failure in exceedingly large structures begins with complex interactions at the metallurgical scale of just tens of microns. Rigorous linking of the very small -to- the very large has proven exceedingly difficult. Developments in nonlinear and computational mechanics, together with high-fidelity laboratory experiments, define an effective path for progress to span the length-scales. This seminar focuses on understanding the behavior of ferritic steels over the ductile-to-brittle temperature transition region as an example of remarkable progress over the past twenty years following this approach. The new developments address simultaneously the coupled effects of plasticity and strong stochastic variability at the micro-scale to provide practitioners with invaluable, quantitative tools for engineering-scale design and assessment.

Modern metals make possible the design, fabrication and construction of very high performance civil, marine and aerospace structures. Metallic structures generally exhibit high levels of ductility with exceptional tolerance for small defects, cracks, pits, and gouges. The fracture process that triggers failure in exceedingly large structures begins with complex interactions at the metallurgical scale of just a few microns. Rigorous linking of the very small -to- the very large has proven exceedingly difficult. This brief talk describes the inherent source of the ductility that makes metal structures highly resilient and highlights a current research project into challenging fracture processes.