

“Improving Military Ground Vehicle Durability through Application of Reliability Based Design Optimization”

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Reliability Based Design Optimization (RBDO) is a capability to do design optimization taking into account stochastic variability and other uncertainties in the problem. Whether the unknowns are aleatoric or epistemic, the fact that we cannot determine all the parameters of the design problem is going to have a serious effect on our optimization. So, RBDO gives a way to perform the design optimization with the variability accounted for, giving a design that is resistant to these variabilities. These methods have been investigated and extended by the U.S. Army, and we will discuss them in this talk.

The U.S. Army has the mission of obtaining the best military ground vehicle fleet, to give our warfighters the greatest chance of a successful mission and a safe homecoming. This requires designing an optimal vehicle. However, uncertainties make this task a big challenge. RBDO is being used by the Army to get better vehicle designs.

A lot of work goes into the "-ilities" (reliability, durability, maintainability, manufacturability, etc.). Design optimization needs to address as many of the "-ilities" as possible to be useful in solving the problem. Each "-ility" reacts differently to variability in the problem space, so the methods used must be able to account for these effects. For vehicle durability, as one example, understanding how the geometry, the materials, the terrain, and the duty cycle can vary is critical to getting the most durable design. The Army makes a point of considering all these variabilities when looking at platform engineering.

The U.S. Army considers reliability of platforms based on mission requirements. We will discuss how the use of RBDO can improve the final design's reliability.

Speaker Biography



Dr. Lamb is an applied mathematician and computer scientist working for the U.S. Army. His personal research is in optimization, especially optimization under uncertainty. He has a B.S. with honors from George Mason University in 1985, where he majored in mathematics. He earned a Ph.D. from the University of Wisconsin-Madison in 1992, under the direction of Prof. Ken Kunen, with a major in mathematics and a minor in computer sciences. He is active with SAE, where he is currently the vice-chairman of the Ground Vehicle Reliability committee, and also with SIAM, where he is the co-President of the Great Lakes Section. He is a Fellow in SAE. He has worked for the U.S. Army Tank-automotive Research, Development, and Engineering Center (TARDEC) since 1994.
