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Mohammad Kurdi

Curriculum Vitae

Personal

Born in Amman, Jordan; United States citizen; married; National Agency Check (NAC)

Education

2002–2005 **PhD in Mechanical Engineering**, *University of Florida*, Gainesville, *4.0*.

1996–1999 **M.Sc in Mechanical Engineering**, *University of Jordan*, Amman, *3.34*.

1989–1995 **B.Sc in Mechanical Engineering**, *University of Jordan*, Amman, *75.3*.

Experience

2008–present **Adjunct faculty**, *University of Dayton*, Dayton, OH.

Taught graduate level course in advanced manufacturing processes. The course emphasized the use of numerical and optimization methods in manufacturing.

2006–present **NRC research associate**, *Air Force Research Laboratory*, Wright-Patterson AFB, OH.

Prototype of mathematical models for the propulsive design of aerodynamic systems. The model is applied in the efficient operation of micro air vehicles.

Developed an uncertainty quantification framework to quantify variations in aeroelastic stability due to variations in geometry, material properties and loading conditions. The framework is successfully implemented in canonical aeroelastic systems.

Developed an optimization formulation for the design of nonlinear dynamic systems; utilizing analytical sensitivity methods. The formulation is applied to the design of fundamental dynamic systems relevant to micro aerial vehicles.

Developed high-order finite element method for the solution of time dependent problems in monolithic-time. The method is very efficient for the analysis of time-periodic systems.

Developed a stochastic simulation tool to model random variations in geometry and material properties.

Communicate research results to the scientific community through conference and journal publications.

2005–2006 **Postdoctoral associate**, *University of Florida*, Gainesville, FL.

Developed a graphical user interface package for selection of optimum operating conditions in high-speed milling considering process dynamics

2003–2005 **Research assistant**, *University of Florida*, Gainesville, FL.

Developed a robust optimization framework to account for criteria sensitivity and parameters variability of the milling process.
Applied time finite element analysis to time delay system present in high-speed milling.
Hands-on experience in modal analysis and measurement of forced frequency response of milling tools.
Hands-on experience in data acquisition systems used in dynamic response measurements.
Conducted experimental tests to quantify the variability and correlation of milling parameters.
Evaluated the variability in performance criteria by accounting for correlation in the experimental measurements; allowing for superior predictions of experimental results.

Publications

M.H. Kurdi and P.S. Beran. Optimization of dynamic response using a monolithic-time formulation. *Journal of Structural and Multidisciplinary Optimization*, 2008, http://dx.doi.org/10.1007/s00158-008-0316-6.

M.H. Kurdi, T.L. Schmitz, R.T. Haftka, and B.P. Mann. A robust semi-analytical method for calculating the response sensitivity of a time delay system. *Journal of Vibration and Acoustics*, 130:1–6, 2008, http://dx.doi.org/10.1115/1.2981093.

M.H. Kurdi and P.S. Beran. Spectral element method in time for rapidly actuated systems. *Journal of Computational Physics*, 227(3):1809–1835, 2008, http://dx.doi.org/10.1016/j.jcp.2007.09.031.

M.H. Kurdi, R.T. Haftka, T.L. Schmitz, and B.P. Mann. Milling optimization of removal rate and accuracy with uncertainty - part 1: parameter selection. *International Journal of Materials and Product Technology*, 35(1/2), 2009.

M.H. Kurdi, T.L. Schmitz, R.T. Haftka, and B.P. Mann. Milling optimization of removal rate and accuracy with uncertainty - part 2: parameter variation. *International Journal of Materials and Product Technology*, 35(1/2), 2009.

Professional development

- Professional Engineering License, January 2009, Sharonville, OH.
- Completed course on Fundamentals of non-deterministic design approaches, April 5–6, 2008, Schaumburg, IL.
- Engineer in Training, June 2008, Sharonville, OH.

Computer skills

Programming	Matlab, C, Fortran	Word processing	LaTex, Word
Graphics modeling	Pro Engineer	Design	MSC.Nastran, Matlab Optimization Toolbox
Aeroelastic analysis	OVERCAP, ZAERO, TecPlot		

Doctoral thesis

Robust multi-criteria optimization of surface location error and material removal rate in high-speed milling under uncertainty

Supervisors Tony Schmitz and Raphael Haftka

Description A robust optimization algorithm is developed for selection of operating conditions in high-speed milling. The algorithm accounts for inherent process uncertainty and sensitivities in part accuracy. Two optimization criteria are considered, namely, part accuracy and material removal rate under the stability constraint. The trade off curve of accuracy versus removal rate is calculated for the mean values of input parameters, as well as for a confidence level in the stability boundary. An experimental validation of the robust optimization algorithm is conducted, including an experimental validation of the variation of the cutting forces as a function of spindle speed. The confidence levels in the stability boundary and accuracy are computed using two methods: 1) sensitivity analysis; and 2) sampling methods. The effect of input parameters correlation is found to yield significant reduction in the response variations; providing more consistent predictions to experimental results.

Undergraduate project

Title *Generalized algorithm for computing the ultimate load capacity of reinforced concrete columns*

Supervisor Mohammad H. Al-Dado

Description The ultimate strength of reinforced concrete columns is investigated. A general purpose computer program is developed for this investigation. The program is capable of computing the ultimate strength for eccentric loads. The column cross-section can be composed of different materials, each possessing an arbitrary geometry. The program provides a complete interaction diagram for the selected cross-section configuration. A numerical example to validate the program computation is presented along with an example for complex cross-section configuration.

Interests

Family Enjoy playing with my children

Running Every now and then I go for a jog

Swimming Like to swim

References

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  Air Force Research Laboratory
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  Mechanical and Aerospace
  Engineering Department
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