

# Stanford

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## Drew Nelson

Professor of Mechanical Engineering, Emeritus

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### Bio

#### BIO

Research involves development of improved methods for predicting the fatigue life of engineering materials, including the effects of manufacturing processes, and investigation of new approaches in the field of experimental mechanics, such as determination of residual stresses using optical methods.

#### ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Mechanical Engineering
- Member, Bio-X
- Member, Cardiovascular Institute

#### HONORS AND AWARDS

- Hetenyi award, Society for Experimental Mechanics (1994)
- Spergel Memorial Award, 32nd IWC Symposium (1984)

#### PROFESSIONAL EDUCATION

- PhD, Stanford , Mechanical Engineering (1978)

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### Teaching

#### COURSES

##### 2022-23

- Experimental Stress Analysis: ME 348 (Aut)
- Fatigue Design and Analysis: ME 345 (Win)

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### Publications

#### PUBLICATIONS

- **Experimental Methods for Determining Residual Stresses and Strains in Various Biological Structures.** *Exp Mech*  
Nelson, D.  
2013
- **Review of Methods for Determining Residual Stresses in Biological Materials.** *In: Exp Appl Mech, Springer*  
Nelson, D.  
2012: 191-202

- **Optical Methods** *Practical Residual Stress Measurement Methods*  
Nelson, D.  
Wiley.2012: 279–302
- **Method for efficient computation of stress intensity factors from weight functions by singular point elimination** *ENGINEERING FRACTURE MECHANICS*  
Mawatari, T., Nelson, D. V.  
2011; 78 (16): 2713-2730
- **Hole-Within-a-Hole Method for Determining Residual Stresses** *JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME*  
Makino, A., Nelson, D. V., Hill, M. R.  
2011; 133 (2)
- **Residual Stress Determination by Hole Drilling Combined with Optical Methods** *EXPERIMENTAL MECHANICS*  
Nelson, D. V.  
2010; 50 (2): 145-158
- **Validated High Speed Pull and Shear Test Methodologies to Evaluate Pb-Free BGA Mechanical Strength.** *In: 43d International Symposium on Microelectronics, International Microelectronics & Packaging Society*  
Ahmad, M., Assudan, R., Nelson, Youssef, A.  
2010: 110-118
- **A multi-parameter Bragg grating fiber optic sensor and triaxial strain measurement** *SMART MATERIALS AND STRUCTURES*  
Mawatari, T., Nelson, D.  
2008; 17 (3)
- **Techniques for predicting the lifetimes of wave-swept macroalgae: a primer on fracture mechanics and crack growth** *JOURNAL OF EXPERIMENTAL BIOLOGY*  
Mach, K. J., Nelson, D. V., Denny, M. W.  
2007; 210 (13): 2213-2230
- **Death by small forces: a fracture and fatigue analysis of wave-swept macroalgae** *JOURNAL OF EXPERIMENTAL BIOLOGY*  
Mach, K. J., Hale, B. B., Denny, M. W., Nelson, D. V.  
2007; 210 (13): 2231-2243
- **Techniques for Predicting Lifetime: a Primer on Fracture Mechanics and Crack Growth in Wave-swept Macroalgae** *J Exp Biol*  
Mach, K., Nelson, D., Denny, M.  
2007; 210: 2213-2230
- **Residual stress determination using hole drilling and 3D image correlation** *EXPERIMENTAL MECHANICS*  
Nelson, D. V., Makino, A., Schmidt, T.  
2006; 46 (1): 31-38
- **Residual Stress Determination Using Digital Image Correlation** *Exp Mech*  
Nelson, D., Makino, A., Schmidt, T.  
2006; 1 (46): 31-38
- **Stable crack growth and instability prediction in thin plates and cylinders** *Workshop on Fundamentals and Applications of the Crack-Tip-Opening-Angle (CTOA)*  
Hampton, R. W., Nelson, D.  
PERGAMON-ELSEVIER SCIENCE LTD.2003: 469–91
- **A study of small crack growth in aluminum alloy 7075-T6** *INTERNATIONAL JOURNAL OF FATIGUE*  
Donnelly, E., Nelson, D.  
2002; 24 (11): 1175-1189
- **Small crack growth in combined bending-torsion fatigue of A533B steel** *FATIGUE & FRACTURE OF ENGINEERING MATERIALS & STRUCTURES*  
Park, J., Nelson, D., Rostami, A.

2001; 24 (3): 179-191

- **Evaluation of an energy-based approach and a critical plane approach for predicting constant amplitude multiaxial fatigue life (vol 22, pg 23, 2000) *INTERNATIONAL JOURNAL OF FATIGUE***  
Park, J., Nelson, D.  
2000; 22 (4): 349-349
- **Evaluation of an energy-based approach and a critical plane approach for predicting constant amplitude multiaxial fatigue life *INTERNATIONAL JOURNAL OF FATIGUE***  
Park, J., Nelson, D.  
2000; 22 (1): 23-39
- **In-Phase and Out-of-Phase Combined Bending-Torsion Fatigue of a Notched Specimen *In: Multiaxial Fatigue and Deformation: Testing and Prediction, ASTM STP***  
Park, J., Nelson, D.  
2000; 1387: 246-265
- **Analysis of Time-Varying Biological Data Using Rainflow Cycle Counting *Comput Meth Biomech Biomed Eng***  
Jacobs, C., Yellowley, C., Nelson, Donahue, H.  
2000; 1 (3): 31-40
- **A fiber optic sensor for transverse strain measurement *EXPERIMENTAL MECHANICS***  
Lawrence, C. M., Nelson, D. V., Udd, E., Bennett, T.  
1999; 39 (3): 202-209
- **Understanding thermal behavior in the LENS process *MATERIALS & DESIGN***  
Griffith, M. L., Schlienger, M. E., Harwell, L. D., Oliver, M. S., Baldwin, M. D., Ensz, M. T., Essien, M., Brooks, J., Robino, C. V., Smugeresky, J. E., Hofmeister, W. H., Wert, M. J., Nelson, et al  
1999; 20 (2-3): 107-113
- **Residual Stress Determination by a Holographic-Hole Drilling Technique *In: Multiaxial Fatigue of an Induction Hardened Shaft, SAE AE28***  
Nelson, D., Makino, A., Foss, S.  
1999: 53-60
- **An embedded fiber optic sensor method for determining residual stresses in fiber-reinforced composite materials *JOURNAL OF INTELLIGENT MATERIAL SYSTEMS AND STRUCTURES***  
Lawrence, C. M., Nelson, D. V., Bennett, T. E., Spingarn, J. R.  
1998; 9 (10): 788-799
- **Thermal behavior in the LENS process *9th Solid Freeform Fabrication (SFF) Symposium***  
Griffith, M. L., Schlienger, M. E., Harwell, L. D., Oliver, M. S., Baldwin, M. D., Ensz, M. T., Smugeresky, J. E., Essien, M., Brooks, J., Robino, C. V., Hofmeister, W. H., Wert, M. J., Nelson, et al  
UNIV TEXAS AUSTIN.1998: 89-96
- **Biaxial fatigue of A533B pressure vessel steel *JOURNAL OF PRESSURE VESSEL TECHNOLOGY-TRANSACTIONS OF THE ASME***  
Nelson, D. V., Rostami, A.  
1997; 119 (3): 325-331
- **Advances in multiaxial fatigue life prediction for components with stress concentrations *INTERNATIONAL JOURNAL OF FATIGUE***  
Tipton, S. M., Nelson, D. V.  
1997; 19 (6): 503-515
- **The holographic-hole drilling method for residual stress determination *OPTICS AND LASERS IN ENGINEERING***  
Nelson, D. V., Makino, A., Fuchs, E. A.  
1997; 27 (1): 3-23
- **In-Phase and Out-of-Phase Combined Bending-Torsion Fatigue of A533B Steel. *J Press Vessel Technol***  
Nelson, D., Rostami, A.  
1997; 3 (119): 325-331
- **Determination of sub-surface distributions of residual stresses by a holographic-hole drilling technique *JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME***

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- Makino, A., Nelson, D. V.  
1997; 119 (1): 95-103
- **Determination of biaxial residual stresses by a holographic-hole drilling technique** *JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME*  
Makino, A., Nelson, D. V., Fuch, E. A., Williams, D. R.  
1996; 118 (4): 583-588
  - **Multi-parameter sensing with fiber Bragg gratings** *2nd Pacific Northwest Fiber Optic Sensor Workshop*  
Lawrence, C. M., Nelson, D. V.  
SPIE - INT SOC OPTICAL ENGINEERING.1996: 24-31
  - **EFFECT OF SURFACE CONDITION AND PRIOR PLASTIC-DEFORMATION ON X-RAY EFFECTIVE ELASTIC PARAMETERS IN A STEEL AND ITS WELD** *EXPERIMENTAL TECHNIQUES*  
Hampton, R. W., Nelson, D. V.  
1995; 19 (4): 25-28
  - **FATIGUE AND FRACTURE ESTIMATION FOR METALLIC COMPONENTS - SOME CURRENT METHODS AND FUTURE-DEVELOPMENTS** *JOURNAL OF MECHANICAL DESIGN*  
Nelson, D. V., Sheppard, S. D.  
1995; 117: 121-127
  - **Fatigue and Fracture Estimation: Some Current Methods and Future Developments** *J Mech Des*  
Nelson, D., Sheppard, S.  
1995; 117: 121-127
  - **A STUDY OF THE GROWTH OF SMALL FATIGUE CRACKS IN A HIGH-STRENGTH STEEL USING A SURFACE-ACOUSTIC-WAVE TECHNIQUE** *FATIGUE & FRACTURE OF ENGINEERING MATERIALS & STRUCTURES*  
Nelson, D. V., YUCE, H. H., CHOW, L. G.  
1994; 17 (11): 1357-1369
  - **RESIDUAL-STRESS DETERMINATION BY SINGLE-AXIS HOLOGRAPHIC-INTERFEROMETRY AND HOLE DRILLING .1. THEORY** *EXPERIMENTAL MECHANICS*  
Makino, A., Nelson, D.  
1994; 34 (1): 66-78
  - **RESIDUAL-STRESS DETERMINATION BY SINGLE-AXIS HOLOGRAPHIC-INTERFEROMETRY AND HOLE DRILLING .2. EXPERIMENTS** *EXPERIMENTAL MECHANICS*  
Nelson, D., Fuchs, E., Makino, A., Williams, D.  
1994; 34 (1): 79-88
  - **Residual Stress Determination by Single-Axis Holographic Interferometry and Hole Drilling - Part II: Experiments.** *Exp Mech*  
Nelson, D., Fuchs, E., Makino, A., Williams, D.  
1994; 1 (34): 79-88
  - **Residual Stress Determination by Single-Axis Holographic Interferometry and Hole Drilling - Part I: Theory** *Exp Mech*  
Makino, A., Nelson, D.  
1994; 1 (34): 66-78
  - **ON THE USE OF THE HOLE-DRILLING TECHNIQUE FOR RESIDUAL-STRESS MEASUREMENTS IN THIN PLATES** *JOURNAL OF PRESSURE VESSEL TECHNOLOGY-TRANSACTIONS OF THE ASME*  
Hampton, R. W., Nelson, D. V.  
1992; 114 (3): 292-299
  - **THE INFLUENCE OF TEMPERING TEMPERATURE ON SMALL FATIGUE CRACK BEHAVIOR MONITORED WITH SURFACE ACOUSTIC-WAVES IN QUENCHED AND TEMPERED 4140 STEEL** *METALLURGICAL TRANSACTIONS A-PHYSICAL METALLURGY AND MATERIALS SCIENCE*  
London, B., Nelson, D. V., SHYNE, J. C.  
1989; 20 (7): 1257-1265
  - **THE EFFECT OF TEMPERING TEMPERATURE ON NEAR-THRESHOLD FATIGUE CRACK BEHAVIOR IN QUENCHED AND TEMPERED 4140 STEEL** *METALLURGICAL TRANSACTIONS A-PHYSICAL METALLURGY AND MATERIALS SCIENCE*
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London, B., Nelson, D. V., SHYNE, J. C.  
1988; 19 (10): 2497-2502

● **RESIDUAL-STRESS DETERMINATION THROUGH COMBINED USE OF HOLOGRAPHIC-INTERFEROMETRY AND BLIND-HOLE DRILLING** *EXPERIMENTAL MECHANICS*

Nelson, D. V., MCCRICKERD, J. T.  
1986; 26 (4): 371-378

● **REVIEW OF FATIGUE-CRACK-GROWTH PREDICTION METHODS** *EXPERIMENTAL MECHANICS*

Nelson, D. V.  
1977; 17 (2): 41-49

● **FLUID PIVOT JOURNAL BEARING** *JOURNAL OF LUBRICATION TECHNOLOGY-TRANSACTIONS OF THE ASME*

Nelson, D. V., HOLLINGSWORTH, L. W.  
1977; 99 (1): 122-128