



WEILI CHENG, Ph.D., P.E.
Senior Mechanical Engineer

SUMMARY

Dr. Cheng has over 30 years of experience in stress analysis and stress distribution, crack propagation and experimental methods for measurement of residual axial stresses in vessels ranging from thin-walled cylinders, water quenched parts, sandwich-brazed plates and omega shaped ring welds on steel blocks. He is an expert in bearing grooves of axles, pyrolytic carbon-coated graphite leaflets in cardiac devices; measurements of dynamic responses such as the Golden Gate Bridge and deformation of natural gas pipe lines. He also has up-to-date knowledge on thermal solar power generation and thermal storage design as well transient thermal-hydraulic modeling.

SELECT INDUSTRY EXPERIENCE

Oil & Gas Industry, Stress Analysis, Dynamic Analysis, Programming, Image Analysis, Computation, Failure Analysis, Medical Devices, Maritime, Construction, Manufacturing, Thermal Hydraulic Modeling, Bearings, Design, Thermal Solar Power, Thermal Storage.

EDUCATION

Ph.D. in Mechanical Engineering from U.C. Berkeley
M.S. in Mechanical Engineering from U.C. Berkeley

AWARDS The Iain Finnie's award from The International Residual Stress Conference in 2011.

PROFESSIONAL EXPERIENCE

1998 – Present,

Senior Mechanical Engineer & Expert, Berkeley Engineering And Research, Inc.

- Review Design of the Golden Gate Bridge Suicide Deterrent System
- Evaluate design of pool filter against blowout caused by air accumulation
- Damper design for Golden Gate Bridge Earthquake Retrofitting.
- Kinetic and dynamic simulation of crane crash
- FEA for valve stem design and safety shear keys
- Investigation of the sheet pile chain breakage
- Animation/simulation of the gas bubble formation and movement that lead to well blowout
- Animation/simulation of gas-liquid flow in centrifugal gas-liquid separator
- Analysis of leakage due to pit formation on a natural gas pipe under corrosive environment
- Simulation of the motion of a skiff during collision with a dredge pipe
- Image analysis including structured light, laser scanning, Lidar, Fire Dynamics Simulator (FDS), and Smokeview (SMV)

04/10 – 08/13

Advisory Engineer and Senior Expert, Areva Solar

- Transient two-phase thermal hydraulic modeling for solar direct steam generators.
- Optimization of Gen2 solar steam generators (SSG)

09/08 – 04/10 Senior Researcher, Ausra

Research and Development of Thermal Storage, CLFR

- Modeling and analysis of fluid-in-medium storage
- Develop thermal storage systems that allows water/steam as its main heat transfer fluid
- Modeling of load matching using CLFR with thermal storage
- Comparison of different storage systems.

2008-2010

Consultant, EPRI

- Weld residual stresses and stress relaxation due to shot-peening.

BOOKS & OTHER PUBLICATIONS

"Control of Solar Steam Generators", with Peter Tanner and et al., POWER2011-55175, ASME, 2011.

"Residual Stress Measurement and the Slitting Method", with Iain Finnie, 2007, Springer, ISBN 0-387-37065-X.

"The Computation And Measurement Of Residual Stresses In Laser Deposited Layers", with S. Finnie and et al., *ASME J. of Eng. Mat. and Tech.*, 125, 1-7 (2003).

Cheng, W. (2002) "A Summary Of Past Contributions In 24 Papers On Residual Stresses", with I. Finnie, the Fourth International Conference on Residual Stresses, 2002, Portugal.

With I. Finnie and R. Ritchie, Residual Stress Measurement on a Pyrolytic Carbon-Coated Graphite Leaflet, (2001).

"Measurement of the Axial Residual Stresses Using the Initial Strain Approach, *ASME J. of Eng. Mat. and Tech.*, 122, 135-140 (2000).

"Determination of the Mode I Stress Intensity Factors for an Edge-Cracked Beam with Fixed Ends, *Eng. Fracture Mech.* 63, 193-208 (1999).

"Analytical and experimental evaluation of residual stresses in BWR core shroud welds", with R. Pathania and et al., ASME Pressure Vess. and Piping Division Pub., Vol. PVP 373, 1998, 337—349.

With Finnie, I. (1998) "The Single-Slice Method for Measurement of Axisymmetric Residual Stresses in Solid Rods or Hollow Cylinders in the Region of Plane Strain, *ASME J. of Eng. Mat. and Tech.* 120, 170-176.

"Experimental Determination of Stress Intensity Factors Due to Residual Stresses, with H. J. Schindler, et al., *Experimental Mechanics*, 37, 272-277, 1997.

"Computation of Stress Intensity Factors for Three-Dimensional Bodies Using Crack-Displacements, with I. Finnie, *Int. J. of Fracture*, 83, 91-104, 1997.

"Residual Stress Measurement by the Introduction of Slots or Cracks, with I. Finnie, "Localized Damage IV, Eds. Nisitani et al. Computation Mechanics Publications, 37-51, 1996.

"Computation of Stress Intensity Factors for a 2-D body from Displacements at an Arbitrary Location, with I. Finnie, *Int. J. of Fracture*, 81, 259-267, 1996.

"Residual Stress Measurement by the Introduction of Slots or Cracks, with I. Finnie, *Proc. Int. Conf. On Localized Damage*, Fukuoha, Japan, June 1996.

"Stress Analysis and Fatigue Life Prediction for a U-Bend Steam Generator tube, with I. Finnie, *Nuclear Engineering and Design*, 165, 101-109, 1996.

"Analysis of the Fluid-Elastic Vibration of a U-Bend Tube Bundle Induced by Cross-Flow in PWR Steam Generators, with I. Finnie, *Nuclear Engineering and Design*, 160 pp. 111-128, 1996.

"Residual Stresses and Fracture Mechanics, with I. Finnie, *ASME J. of Eng. Mat. and Tech.* 117 pp. 373-378, 1995.

"An Overview of the Crack Compliance Method for Residual Stress Measurement," presented at the Fourth International Conference on Residual Stresses, with I. Finnie, *Proceedings of the Fourth International Conference on Residual Stresses*, Baltimore, pp. 449-458, 1994.

"Measurement of Residual Stress Distribution in a Disk or Solid Cylinder Using the Crack Compliance Technique," with H. J. Schindler, et al, *Fourth International Conference on Residual Stresses*, Baltimore, June, 1994.

"The Compliance Method for Measurement of Near Surface Residual Stresses – Application and Validation for Surface Treatment by Laser and Shot-Peening," with I. Finnie and et al, *ASME J. of Eng. Mat. and Tech.* 116, pp. 556-560, 1994.

"The Compliance Method for Measurement of Near Surface Residual Stresses – Analytical Background," with M. Gremaud and et al in *ASME J. of Eng. Mat. and Tech.*, 116, pp. 550-555, 1994.

"Measurement of Near Surface Residual Stress Using Electric Discharge Wire Machining," with M. Gremaud and et al, *ASME J. of Eng. Mat. and Tech.*, 116, 1-7, 1994.

"Measurement of Residual Stress Distributions Near the Toe of an Attachment Welded on a Plate Using the Crack Compliance Method ", with I. Finnie, *Eng. Fracture Mech.*, 46, 79-92, 1993.

"A Comparison of the Strains due to Edge Cracks and Cuts of Finite Width With Applications to Residual Stress Measurement", with I. Finnie, *ASME J. of Eng. Mat. and Tech.*, 115, 220-226, 1993.

"A Prediction of the Strength of Glass Following the Formation of Sub-Surface Flaws by Scribing," with I. Finnie, *Journal of Am. Ceramic Soc.*, 75, pp. 2565-72 (1992).

"Measurement of Residual Stresses in Laser Treated Layers Using the Crack Compliance Method," with M. Gremaud, et al, *Proc. of Int. Conf. on Laser Advanced Materials Processing*, Edited by Matsunawa and Katayama, 713-718, 1992.

"Measurement of Residual Stress Distributions near the Toe of a Weld Between a Bracket and a Plate Using the Crack Compliance Method," with I. Finnie, *Proc. of IUTAM Symposium, Mechanical Effects of Welding*, Edited by L. Karisson, L. Lindgren and M. Jonsson, Springer-Verlag Berlin Heidelberg, 135-141, 1992.

"Deformation of an Edge-cracked Strip Subjected to Arbitrary Shear Surface Traction on the Crack Faces", with I. Finnie, *Eng. Fracture Mechanics*, 43, pp. 33-40, 1992.

"Measurement of Residual Stresses Through the Thickness of a Strip Using the Crack-Compliance Method," with M. Prime, et al, *Residual Stresses - III Science and Technology Vol. 2*, Edited by H. Fujiwara, T. Abe and K. Tanaka, Elsevier Science Publishers, London and New York, pp. 1127-1132, 1992.

"Estimation of Axisymmetric Residual Stresses in a Long Cylinder," with I. Finnie, et al, *ASME J. of Eng. Mat. Tech.*, 114, pp. 137-140, 1992.

"Deformation of an Edge-Cracked Strip Subjected to Normal Surface Traction on the Crack Faces," with Ö. Vardar, et al, *Eng. Fracture Mechanics*, 42, pp. 97-108, 1992.

"An Experimental Method for Determining Residual Stresses in Welds," With I. Finnie, In *Modeling of Casting, Welding and Advanced Solidification Processes - V*, (M. Rappaz ed.), The Minerals Metals and Materials Soc. Warrendale, PA, USA (1991).

"Measurement of Residual Stresses Near the Surface Using the Crack Compliance Method," with Ö. Vardar, et al, *ASME J. of Eng. Mat. and Tech.*, 113, pp. 199-204 (1990).

"Delayed Crack Propagation in a Steel Pressure Vessel Due to Thermal Stresses," with I. Finnie and K. J. McCorkindale, *Int. J. Pres. &Piping*, 42, pp. 15-31 (1990).

"The Crack Compliance Method for Residual Stress Measurement," with I. Finnie, *Welding in the World*, 28, pp. 103-110 (1990).

"Median Cracking of Brittle Solids due to Scribing With Sharp Indenters," with E. Ling, et al, *Journal of Am. Ceramic Soc.*, 73, pp. 580-86 (1990).

"K_{II} Solutions for an Edge-Cracked Strip," with I. Finnie, *Eng. Fracture Mechanics*, 36, pp. 355-360 (1990).

"A Mechanism for Subsurface Median Crack Initiation in Glass During Indenting and Scribing," with I. Finnie, *J. of Mat. Sci.*, 25, pp. 575-579 (1990).

"Stress Intensity Factors for Radial Cracks in Cylinders and Other Simply Closed Bodies," with I. Finnie, *Eng. Fracture Mechanics*, 32, pp. 767-774 (1989).

"K_I Solution for an Edge-Cracked Strip," with I. Finnie, *Eng. Fracture Mechanics*, 31, pp. 201-207 (1988).

"A New Method for Measurement of Residual Axial Stresses Applied to a Multi-Pass Butt-Welded Cylinder," with I. Finnie, *ASME J. of Eng. Mat. and Tech.*, 109, pp. 337-342 (1987).

"Determination of Stress Intensity Factors for Partial Penetration Axial Cracks in Thin-Walled Cylinders," with I. Finnie, *ASME J. of Eng. Mat. and Tech.*, 108, pp. 83-86 (1986).

"Measurement of Residual Hoop Stresses in Cylinders Using the Compliance Method," with I. Finnie, *ASME J. of Eng. Mat. and Tech.*, 108, pp. 87-92 (1986).

"Examination of the Computational Model for the Layer-Removal Method for Residual-Stress Measurement," with I. Finnie, *SEM Experimental Mechanics*, 26, pp. 150-152 (1986).

"A Method for Measurement of Axisymmetric Residual Stresses in Circumferentially Welded Thin-Walled Cylinders," with I. Finnie, *ASME, J. of Eng. Mat. and Tech.*, 106, pp. 181-185 (1985).

"On the Prediction of Stress Intensity Factors for Axisymmetric Cracks in Thin-Walled Cylinders From Plane Strain Solutions," with I. Finnie, *ASME J. of Eng. Mat. and Tech.*, 106, pp. 227-231 (1985).

"Prediction of the Stress Intensity Factor for an Internal Circumferential Crack at a Butt-Weld Between Cylinders Using Plane Strain Solutions," with G. Stevick, et al, *ASME J. of Eng. Mat. and Tech.*, 106, pp. 21-24 (1984).