Curriculum Vitae

Wen-Ruey Chang, Ph.D., P.E.

Dr. Wen-Ruey Chang is available for consultations on issues related to slips, trips and falls.

Summary of Major Achievements

Dr. Chang is one of the leading researchers on slips, trips and falls in the world with the following recognitions:

Fellow, International Ergonomics Association (IEA), 2016
Fellow, American Society of Mechanical Engineers (ASME), 2005 in recognition of contributions to safety and ergonomics research in slips, trips and falls
Fellow, The Institute of Ergonomics and Human Factors (formerly known as The Ergonomics Society), UK, 2006 in recognition of contributions to safety and ergonomics research in slips, trips and falls
Recipient of the William Floyd Award, The Institute of Ergonomics and Human Factors (formerly known as The Ergonomics Society), UK, 2003 in recognition of contributions to the measurements of slipperiness
Recipient of National Occupational Research Agenda (NORA) Partnering Award for Worker Health and Safety, the National Institute for Occupational Safety and Health (NIOSH), 2006 in recognition of ergonomics interventions to reduce slips, trips and falls among healthcare workers
The Best Paper Award in *Ergonomics,* 2009 (JL Bell, JW Collins, L Wolf, R Grönqvist, SS Chiou, **WR Chang**, GS Sorock, TK Courtney, DA Lombardi, B Evanoff, 2008, Evaluation of a Comprehensive Slip, Trip, and Fall Prevention Program for Hospital Employees, *Ergonomics*, 51 (12), 1906-1925.)
The Outstanding Alumni Award, National Chung-Hsing University, Taiwan, 2006
Editor, *Ergonomics*
Leading editor in *Measuring Slipperiness - Human Locomotion and Surface Factors* (ed. **WR Chang**, TK Courtney, R Grönqvist, MS Redfern), Taylor & Francis, London, ISBN 0-415-29828-8, 2003.
Organizers and chairmen of international symposia at major ergonomics and safety conferences around the world
Guest Editor of special issues in *Ergonomics* (2001, 2008), *Safety Science* (2002, 2005) and *Industrial Health* (2008, 2014)
Chair (2006-2012), Past Chair (2012-present) and founder, technical committee on slips, trips and falls, International Ergonomics Association
Member of the editorial board, *Applied Ergonomics*, *Safety Science*, *Journal of Testing and Evaluation*
Technical Editor of slip, trip and fall contact group website: www.slipstripsfalls.org
Summa Cum Laude, National Chung-Hsing University, 1979

Personal

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Education

Ph.D., 1986, Mechanical Engineering, University of California, Berkeley, California 94720
Major: continuum mechanics, Minors: dynamics and mathematics
M.S., 1983, Mechanical Engineering, University of California, Berkeley, California 94720
B.S., 1979, Mechanical Engineering, National Chung-Hsing University, Taichung, Taiwan

License/Accreditation

Registered Professional Engineer State of Massachusetts, Mechanical Engineering (#52682)

Professional Experience

Chang WR Falls Prevention, LLC, Arlington, Virginia
Principal, 2017 - present.

Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts
Senior Research Scientist, 1995 - 2017.

Aerospace Corporation, El Segundo, California
Member of Technical Staff, 1994 - 1995.

General Electric Corporate Research and Development Center, General Electric Company, Niskayuna, New York
Staff Engineer, 1990 - 1993.

Digital Equipment Corporation, Shrewsbury, Massachusetts
Senior Mechanical Engineer, 1986 - 1990.

Teaching Experience

Guest Instructor, School of Public Health graduate course EH 241: Occupational safety and injury prevention, Harvard University, 2009-Present.
Guest Instructor, Ergonomics and Human Factors: Applications in Occupational Health, Harvard University, 1998-2012.
Guest Instructor, Advanced Ergonomics, Liberty Mutual Insurance Group, 1996-2010.
Guest Instructor, Certified Safety Professional Review, Harvard University, 1997-98.
Teaching Assistant at University of California, Berkeley - Dynamics and Statics, 1982, 1983.
Instructor at Chinese Military Academy - Design of Machine Element and Strength of Materials, 1979-81.

Publications

Journal Papers

1. DB Bogy, G Bouchard, **WR Chang**, FE Talke, 1986, Use of the Laser-Doppler Vibrometer to Measure the Surface Topography of Magnetic Disks, *Wear*, 107 (3), 227-244. http://dx.doi.org/10.1016/0043-1648(86)90227-9.

2. **WR Chang**, I Etsion, DB Bogy, 1987, An Elastic-Plastic Model for the Contact of Rough Surfaces, ASME *Journal of Tribology*, 109 (2), 257-263. http://dx.doi.org/10.1115/1.3261348.

3. **WR Chang,** I Etsion, DB Bogy, 1988, Adhesion Model for Metallic Rough Surfaces, ASME *Journal of Tribology*, 110 (1), 50-56. http://dx.doi.org/10.1115/1.3261574.

4. **WR Chang,** I Etsion, DB Bogy, 1988, Static Friction Coefficient Model for Metallic Rough Surfaces, ASME *Journal of Tribology*, 110 (1), 57-63. http://dx.doi.org/10.1115/1.3261575.

5. **WR Chang**, FF Ling, 1992, Normal Impact Model of Rough Surfaces, ASME *Journal of Tribology*, 114 (3), 439-447. http://dx.doi.org/10.1115/1.2920903.

6. **WR Chang,** FF Ling, 1994, Theory of Life Prediction of a Viscoelastic Lubricating Surface Film, STLE *Tribology Transactions*, 37 (2), 396-402. http://dx.doi.org/10.1080/10402009408983308.

7. **WR Chang**, 1997, An Elastic-Plastic Contact Model for a Rough Surface with an Ion-Plated Soft Metallic Coating, *Wear*, 212 (2), 229-237. http://dx.doi.org/10.1016/S0043-1648(97)00148-8.

8. **WR Chang**, 1998, The Effect of Surface Roughness on Dynamic Friction between Neolite and Quarry Tile, *Safety Science*, 29 (2), 89-105. http://dx.doi.org/10.1016/S0925-7535(98)00011-3.

9. GA Hampel, **WR Chang**, 1999, Body Height Change from Motor Vehicle Vibration, *International Journal of Industrial Ergonomics*, 23, 489-498. http://dx.doi.org/10.1016/S0169-8141(98)00008-0.

10. **WR Chang**, 1999, The Effect of Surface Roughness on the Measurement of Slip Resistance, *International Journal of Industrial Ergonomics*, 24, 299-313. http://dx.doi.org/10.1016/S0169-8141(98)00038-9.

11. **WR Chang**, S Matz, 2000, The Effect of Filtering Processes on Surface Roughness Parameters and Their Correlation with the Measured Friction, Part I: Quarry Tiles, *Safety Science*, 36 (1), 19-33. http://dx.doi.org/10.1016/S0925-7535(99)00032-6.

12. **WR Chang**, 2000, The Effect of Filtering Processes on Surface Roughness Parameters and Their Correlation with the Measured Friction, Part II: Porcelain Tiles, *Safety Science*, 36 (1), 35-47. http://dx.doi.org/10.1016/S0925-7535(00)00015-1.

13. **WR Chang**, 2001, The Effect of Surface Roughness and Contaminant on the Dynamic Friction of Porcelain Tile, *Applied Ergonomics,* 32 (2), 173-184. http://dx.doi.org/10.1016/S0003-6870(00)00054-5.

14. **WR Chang**, S Matz, 2001, The Slip Resistance of Common Footwear Materials Measured with Two Slipmeters, *Applied Ergonomics*, 32 (6), 549-558. http://dx.doi.org/10.1016/S0003-6870(01)00031-X.

15. R Grönqvist, **WR Chang**, TK Courtney, TB Leamon, MS Redfern, L Strandberg, 2001, Measurement of Slipperiness: Fundamental Concepts and Definitions, *Ergonomics*, 44 (13), 1102-1117. http://dx.doi.org/10.1080/00140130110085529.

16. **WR Chang**, IJ Kim, DP Manning, Y Bunterngchit, 2001, The Role of Surface Roughness in the Measurement of Slipperiness, *Ergonomics*, 44 (13), 1200-1216. http://dx.doi.org/10.1080/00140130110085565.

17. **WR Chang**, R Grönqvist, S Leclercq, R Myung, L Makkonen, L Strandberg, RJ Brungraber, U Mattke, SC Thorpe, 2001, The Role of Friction in the Measurement of Slipperiness, Part 1: Friction Mechanisms and Definition of Test Conditions, *Ergonomics*, 44 (13), 1217-1232. http://dx.doi.org/10.1080/00140130110085574.

18. **WR Chang**, R Grönqvist, S Leclercq, RJ Brungraber, U Mattke, L Strandberg, SC Thorpe, R Myung, L Makkonen, TK Courtney, 2001, The Role of Friction in the Measurement of Slipperiness, Part 2: Survey of Friction Measurement Devices, *Ergonomics*, 44 (13), 1233-1261. http://dx.doi.org/10.1080/00140130110085583.

19. **WR Chang**, 2002, The Effects of Surface Roughness and Contaminants on the Dynamic Friction Between Porcelain Tile and Vulcanized Rubber, *Safety Science*, 40 (7-8), 577-591. http://dx.doi.org/10.1016/S0925-7535(01)00060-1.

20. **WR Chang**, 2002, The Effects of Slip Criterion and Time on Friction Measurements, *Safety Science,* 40 (7-8), 593-611. http://dx.doi.org/10.1016/S0925-7535(01)00061-3.

21. **WR Chang**, JP Cotnam, S Matz, 2003, Field Evaluation of Two Commonly Used Slipmeters, *Applied Ergonomics*, 34 (1), 51-60. http://dx.doi.org/10.1016/S0003-6870(02)00074-1.

22. JC Chen, **WR Chang**, TS Shih, CJ Chen, WP Chang, JT Dennerlein, LM Ryan, DC Christiani, 2003, Predictors of Whole-Body Vibration Levels among Urban Taxi Drivers, *Ergonomics,* 46 (11), 1075-1090. http://dx.doi.org/10.1080/0014013031000109205.

23. **WR Chang**, 2004, Preferred Surface Microscopic Geometric Features on Floors as Potential Interventions for Slip and Fall Accidents on Liquid Contaminated Surfaces, *Journal of Safety Research*, 35 (1), 71-79. http://dx.doi.org/10.1016/j.jsr.2003.09.017.

24. KW Li, **WR Chang**, TB Leamon, CJ Chen, 2004, Floor Slipperiness Measurement: Friction Coefficient, Roughness of Floors, and Subjective Perception under Spillage Conditions, *Safety Science*, 42 (6), 547-565. http://dx.doi.org/10.1016/j.ssci.2003.08.006.

25. JC Chen, **WR Chang**, TS Shih, CJ Chen, WP Chang, JT Dennerlein, LM Ryan, DC Christiani, 2004, Using "Exposure Prediction Rules" for Exposure Assessment: An Example on Whole-Body Vibration in Taxi Drivers, *Epidemiology*, 15 (3), 293-299.

http://dx.doi.org/10.1097/01.ede.0000121378.62340.a7.

26. **WR Chang**, KW Li, YH Huang, A Filiaggi, TK Courtney, 2004, Assessing Floor Slipperiness in Fast-Food Restaurants in Taiwan using Objective and Subjective Measures, *Applied Ergonomics*, 35 (4), 401-408. http://dx.doi.org/10.1016/j.apergo.2004.01.006.

27. **WR Chang**, R Grönqvist, M Hirvonen, S Matz, 2004, The Effect of Surface Waviness on Friction Between Neolite and Quarry Tiles, *Ergonomics*, 47 (8), 890-906. http://dx.doi.org/10.1080/00140130410001670390.

28. **WR Chang**, M Hirvonen, R Grönqvist, 2004, The Effects of Cut-Off Length on Surface Roughness Parameters and Their Correlation with Transition Friction, *Safety Science*, 42 (8), 755-769. http://dx.doi.org/10.1016/j.ssci.2004.01.002.

29. **WR Chang**, 2004, A Statistical Model to Estimate the Probability of Slip and Fall Incidents, *Safety Science*, 42 (9), 779-789. http://dx.doi.org/10.1016/j.ssci.2004.02.001.

30. **WR Chang**, CC Chang, S Matz, DH Son, 2004, Friction Requirements for Different Climbing Conditions in Straight Ladder Ascending, *Safety Science*, 42 (9), 791-805. http://dx.doi.org/10.1016/j.ssci.2004.02.002.

31. **WR Chang**, CC Chang, 2005, Portable Ladders: Understanding and Preventing Slips at their Bases, *Professional Safety*, 50 (9), 26-31.

32. JC Chen, JT Dennerlein, CC Chang, **WR Chang**, DC Christiani, 2005, Seat Inclination, Use of Lumbar Support, and Low Back Pain, *Scandinavian Journal of Work, Environment and Health*, 31 (4), 258-265. http://dx.doi.org/10.5271/sjweh.881

33. CC Chang, **WR Chang**, S Matz, 2005, The Effects of Straight Ladder Setup and Usage on Ground Reaction Forces and Friction Requirements during Ascending and Descending, *Safety Science*, 43 (7), 469-483. http://dx.doi.org/10.1016/j.ssci.2005.08.002.

34. **WR Chang**, CC Chang, S Matz, 2005, Available Friction of Ladder Shoes and Slip Potential for Climbing on a Straight Ladder, *Ergonomics*, 48 (9), 1169-1182. http://dx.doi.org/10.1080/00140130500197229.

35. JC Chen, **WR Chang**, WP Chang, DC Christiani, 2005, Occupational Factors Associated with Low Back Pain in Urban Taxi Drivers, *Occupational Medicine*, 55 (7), 535-540. http://dx.doi.org/10.1093/occmed/kqi125.

36. **WR Chang**, WS Maynard, 2006, Factors Influencing the Slip Index Measurements with the Horizontal Pull Slipmeter, *Work*, 26 (2), 99-105.

37. KW Li, **WR Chang**, JC Wei, CH Kou, 2006, Friction Measurements on Ramps Using the Brungraber Mark II Slipmeter, *Safety Science*, 44 (5), 375-386. http://dx.doi.org/10.1016/j.ssci.2005.11.003.

38. KW Li, **WR Chang**, CH Lin, JC Wei, 2006, Relationship between the Measured Friction Coefficients of Floors on a Horizontal Surface and on a 10° Ramp, *International Journal of Industrial Ergonomics*, 36 (8), 705-711. http://dx.doi.org/10.1016/j.ergon.2006.05.002.

39. TK Courtney, YH Huang, SK Verma, **WR Chang**, KW Li, A Filiaggi, 2006, Factors Influencing Restaurant Worker Perception of Floor Slipperiness, *Journal of Occupational and Environmental Hygiene*, 3 (11), 593-599. http://dx.doi.org/10.1080/15459620600934367.

40. KW Li, TK Courtney, YH Huang, **WR Chang**, A Filiaggi, 2006, Slips and Falls: Employee Experience and Perception of Floor Slipperiness: a Field Survey in Fast-Food Restaurants, *Professional Safety*, 51 (9), 34-38.

41. **WR Chang**, KW Li, YH Huang, A Filiaggi, TK Courtney, 2006, Objective and Subjective Measurements of Slipperiness in Fast-Food Restaurants in the USA and Their Comparison with the Previous Results Obtained in Taiwan, *Safety Science*, 44 (10), 891-903. http://dx.doi.org/10.1016/j.ssci.2006.06.001.

42. KW Li, YW Hsu, **WR Chang,** CH Lin, 2007, Friction Measurements on Three Commonly used Floors on a College Campus under Dry, Wet, and Sand-Covered Conditions, *Safety Science*, 45 (9), 980-992. http://dx.doi.org/10.1016/j.ssci.2006.08.030.

43. **WR Chang**, YH Huang, KW Li, A Filiaggi, TK Courtney, 2008, Assessing Slipperiness in Fast-Food Restaurants in the USA using Friction Variation, Friction Level and Perception Rating, *Applied Ergonomics*, 39 (3), 359-367. http://dx.doi.org/10.1016/j.apergo.2007.08.004.

44. **WR Chang**, CC Chang, S Matz, MF Lesch, 2008, A Methodology to Quantify the Stochastic Distribution of Friction Coefficient Required for Level Walking, *Applied Ergonomics*, 39 (6), 766-771. http://dx.doi.org/10.1016/j.apergo.2007.11.003.

45. KW Li, CC Chang, **WR Chang**, 2008, Slipping of the Foot on the Floor when Pulling a Pallet Truck, *Applied Ergonomics,* 39 (6), 812-819. http://dx.doi.org/10.1016/j.apergo.2007.06.002.

46. JL Bell, JW Collins, L Wolf, R Grönqvist, SS Chiou, **WR Chang**, GS Sorock, TK Courtney, DA Lombardi, B Evanoff, 2008, Evaluation of a Comprehensive Slip, Trip, and Fall Prevention Program for Hospital Employees, *Ergonomics*, 51 (12), 1906-1925. http://dx.doi.org/10.1080/00140130802248092. (recipient of **the Best Paper Award** in *Ergonomics* 2009)

47. SK Verma, DA Lombardi, **WR Chang**, TK Courtney, MJ Brennan, 2008, A Matched Case-Control Study of Circumstances of Occupational Same-Level Falls and Risk of Wrist, Ankle and Hip Fracture in Women over 45 Years of Age, *Ergonomics*, 51 (12), 1960-1972. http://dx.doi.org/10.1080/00140130802558987.

48. MF Lesch, **WR Chang**, CC Chang, 2008, Visually Based Perceptions of Slipperiness: Underlying Cues, Consistency, and Relationship to Coefficient of Friction, *Ergonomics*, 51 (12), 1973-1983. http://dx.doi.org/10.1080/00140130802558979.

49. **WR Chang**, MF Lesch, CC Chang, 2008, The Effect of Contact Area on Friction Measured

with the Portable Inclinable Articulated Strut Slip Tester (PIAST), *Ergonomics*, 51 (12), 1984-1997. http://dx.doi.org/10.1080/00140130802562633.

50. **WR Chang**, KW Li, A Filiaggi, YH Huang, TK Courtney, 2008, Friction Variation in Common Working Areas of Fast-Food Restaurants in the USA, *Ergonomics*, 51 (12), 1998-2012. http://dx.doi.org/10.1080/00140130802562641.

51. KW Li, **WR Chang**, CC Chang, 2009, Evaluation of Two Models of a Slipmeter, *Safety Science*, 47 (10), 1434-1439. http://dx.doi.org/10.1016/j.ssci.2009.04.006.

52. **WR Chang**, S Matz, R Grönqvist, M Hirvonen, 2010, Linear Regression Models of Floor Surface Parameters on Friction between Neolite and Quarry Tiles, *Applied Ergonomics*, 41 (1), 27-33. http://dx.doi.org/10.1016/j.apergo.2009.03.006.

53. **WR Chang**, C Brunette, CC Chang, 2010, Development of an Objective Determination of a Slip with a Portable Inclineable Articulated Strut Slip Tester (PIAST), *Safety Science*, 48 (1), 100-109. http://dx.doi.org/10.1016/j.ssci.2009.07.001.

54. SK Verma, **WR Chang**, TK Courtney, DA Lombardi, YH Huang, MJ Brennan, MA Mittleman, MJ Perry, 2010, Workers' Experience of Slipping in US Limited-Service Restaurants, *Journal of Occupational & Environmental Hygiene*, 7 (9), 491-500. http://dx.doi.org/10.1080/15459624.2010.486693.

55. TK Courtney, SK Verma, YH Huang, **WR Chang**, KW Li, A Filiaggi, 2010, Factors Associated with Worker Slipping in Limited-Service Restaurants, *Injury Prevention*, 16 (1), 36-41. http://dx.doi.org/10.1136/ip.2009.022749.

56. **WR Chang**, TK Courtney, YH Huang, KW Li, A Filiaggi, SK Verma, 2011, Underlying Factors Influencing Perception of Floor Slipperiness in Fast Food Restaurants, *Professional Safety*, 56 (5), 62-69.

57. **WR Chang**, CC Chang, S Matz, 2011, The Effect of Transverse Shear Force on the Required Coefficient of Friction for Level Walking, *Human Factors*, 53 (5), 461-473. http://dx.doi.org/10.1177/0018720811414885.

58. SK Verma, **WR Chang**, TK Courtney, DA Lombardi, YH Huang, MJ Brennan, MA Mittleman, JH Ware, MJ Perry, 2011, A Prospective Study of Floor Surface, Shoes, Floor Cleaning and Slipping in U.S. Limited-Service Restaurant Workers, *Occupational and Environmental Medicine,* 68 (4), 279 - 285. http://dx.doi.org/10.1136/oem.2010.056218.

59. SK Verma, DA Lombardi, **WR Chang**, TK Courtney, YH Huang, MJ Brennan, MA Mittleman, JH Ware, MJ Perry, 2011, Rushing, Distraction, Walking on Contaminated Floors and Risk of Slipping in Limited-service Restaurants – a Case-Crossover Study, *Occupational and Environmental Medicine,* 68 (8), 575 - 581. http://dx.doi.org/10.1136/oem.2010.056226.

60. **WR Chang**, S Matz, CC Chang, 2012, A Comparison of Required Coefficient of Friction for Both Feet in Level Walking, *Safety Science*, 50 (2), 240 - 243. http://dx.doi.org/10.1016/j.ssci.2011.08.056.

61. **WR Chang**, CC Chang, S Matz, 2012, Comparison of Different Methods to Extract the Required Coefficient of Friction for Level Walking, *Ergonomics*, 55 (3), 308 - 315. http://dx.doi.org/10.1080/00140139.2011.642008.

62. YH Huang, SK Verma, **WR Chang**, TK Courtney, DA Lombardi, MJ Brennan, MJ Perry, 2012, Supervisor vs. Employee Safety Perceptions and Association with Future Injury in US Limited-Service Restaurant Workers, *Accident Analysis and Prevention*, 47, 45 - 51. http://dx.doi.org/10.1016/j.aap.2011.11.023.

63. YH Huang, SK Verma, **WR Chang**, TK Courtney, DA Lombardi, MJ Brennan, MJ Perry, 2012, Management Commitment to Safety vs. Employee Perceived Safety Training and Association with Future Injury, *Accident Analysis and Prevention*, 47, 94 - 101. http://dx.doi.org/10.1016/j.aap.2011.12.001.

64. **WR Chang**, S Matz, CC Chang, 2012, The Stochastic Distribution of Available Coefficient of Friction on Quarry Tiles for Human Locomotion, *Work*, 41, 3363-3366. http://dx.doi.org/10.3233/WOR-2012-0608-3363.

65. **WR Chang**, S Matz, CC Chang, 2012, Stochastic Distribution of the Required Coefficient of Friction for Level Walking – an in-Depth Study, *Ergonomics*, 55 (8), 937 - 945. http://dx.doi.org/10.1080/00140139.2012.683880.

66. SK Verma, TK Courtney, H Corns, YH Huang, DA Lombardi, **WR Chang**, MJ Brennan, MJ Perry, 2012, Factors Associated with Use of Slip-resistant Shoes in U.S. Limited-Service Restaurant Workers, *Injury Prevention*, 18(3), 176 - 181. http://dx.doi.org/10.1136/injuryprev-2011-040094.

67. TK Courtney, SK Verma, **WR Chang**, YH Huang, DA Lombardi, MJ Brennan, MJ Perry, 2013, Perception of Slipperiness and Prospective Risk of Slipping at Work, *Occupational and Environmental Medicine,* 70 (1), 35 - 40. http://dx.doi.org/10.1136/oemed-2012-100831.

68. **WR Chang**, S Matz, CC Chang, 2013, The Available Coefficient of Friction Associated with Different Slip Probabilities for Level Straight Walking, *Safety Science*, 58, 49 - 52. http://dx.doi.org/10.1016/j.ssci.2013.03.014.

69. SK Verma, TK Courtney, DA Lombardi, **WR Chang**, YH Huang, MJ Brennan, MJ Perry, 2014, Internet and Telephonic IVR Mixed-mode Survey for Longitudinal Studies: Choice, Retention, Data Equivalency, *Annals of Epidemiology*, 24 (1), 72 - 74. http://dx.doi.org/10.1016/j.annepidem.2013.10.004

70. J Lee, YH Huang, MM Robertson, LA Murphy, A Garabet, **WR Chang**, 2014, External Validity of a Generic Safety Climate Scale for Lone Workers across Different Industries and Companies, *Accident Analysis and Prevention*, 63, 138 - 145. http://dx.doi.org/10.1016/j.aap.2013.10.013.

71. **WR Chang**, S Matz, CC Chang, 2014, The Stochastic Distribution of Available Coefficient of Friction for Human Locomotion of Five Different Floor Surfaces, *Applied Ergonomics*, 45 (3), 811 - 815. http://dx.doi.org/10.1016/j.apergo.2013.10.006.

72. AJ Caban-Martinez, TK Courtney, **WR Chang**, DA Lombardi, YH Huang, MJ Brennan, MJ Perry, JN Katz, SK Verma, 2014, Preventing Slips and Falls through Leisure-Time Physical Activity: Findings from a study of Limited-Service Restaurants, PLoS ONE, 9(10), e110248. http://dx.doi.org/10.1371/journal.pone.0110248.

73. SK Verma, Z Zhao, TK Courtney, **WR Chang**, DA Lombardi, YH Huang, MJ Brennan, MJ Perry, 2014, Duration of Slip-Resistant Shoe Usage and the Rate of Slipping in Limited-Service Restaurants: Results from a Prospective and Crossover Study, *Ergonomics*, 57 (12), 1919 - 1926. http://dx.doi.org/10.1080/00140139.2014.952348.

74. **WR Chang**, MF Lesch, CC Chang, S Matz, 2015, Contribution of Gait Parameters and Available Coefficient of Friction to Perceptions of Slipperiness, *Gait & Posture,* 41, 288 - 290. http://dx.doi.org/10.1016/j.gaitpost.2014.08.010.

75. JJ Banks, **WR Chang**, X Xu, CC Chang, 2015, Using Horizontal Heel Displacement to Identify Heel Strike Instants in Normal Gait, *Gait & Posture*, 42 (1), 101-103. http://dx.doi.org/10.1016/j.gaitpost.2015.03.015.

76. AJ Caban-Martinez, TK Courtney, **WR Chang**, DA Lombardi, YH Huang, MJ Brennan, MJ Perry, JN Katz, DC Christiani, SK Verma, 2015, Leisure-Time Physical Activity, Falls, and Fall Injuries in Middle-Aged Adults, *American Journal of Preventive Medicine*, 49 (6), 888-901. http://dx.doi.org/10.1016/j.amepre.2015.05.022.

77. DI Swedler, SK Verma, YH Huang, DA Lombardi, **WR Chang**, M Brennan, TK Courtney, 2015, A Structural Equation Modeling Approach Examining the Pathways between Safety Climate, Behavior Performance and Workplace Slipping, *Occupational and Environmental Medicine*, 72 (7), 476-481. http://dx.doi.org/10.1136/oemed-2014-102496.

78. MF Lesch, CC Chang, **WR Chang**, 2016, Prospective Gait Changes as a Function of Shifting Perceptions of Slipperiness: Effects of Visual and Somatosensory Cues, *Ergonomics,* 59 (5), 704-716. http://dx.doi.org/10.1080/00140139.2015.1082631.

79. **WR Chang**, S Leclercq, TE Lockhart, R Haslam, 2016, State of Science: Occupational Slips, Trips and Falls on the Same Level, *Ergonomics*, 59 (7), 861-883. http://dx.doi.org/10.1080/00140139.2016.1157214.

80. **WR Chang**, YH Huang, CC Chang, C Brunette, N Fallentin, 2016, Straight Ladder Inclined Angle in a Field Environment: The Relationship among Actual Angle, Method of Set-up and Knowledge, *Ergonomics*, 59 (8), 1100-1108. http://dx.doi.org/10.1080/00140139.2015.1115897.

81. **WR Chang**, CC Chang, MF Lesch, S Matz, 2017, Gait Adaptation on Surfaces with Different Degrees of Slipperiness, *Applied Ergonomics*, 59, 333-341. http://dx.doi.org/10.1016/j.apergo.2016.09.008.

Selected Conference Papers

1. FF Ling, **WR Chang**, 1993, On the Prediction of Gradual Wear Life of Solid Lubricating Films, The Proceedings of the 6th International Congress on Tribology, Budapest, Hungary, Vol. 2, pp. 303-309.

2. GA Hampel, **WR Chang**, 1996, Body Height Change from Motor Vehicle Vibration, presented at the International Mechanical Engineering Congress and Exposition ASME Winter Annual Meeting, Atlanta, USA, BED-Vol. 33, 1996 Advances in Bioengineering, ASME, pp. 7-8.

3. **WR Chang**, TB Leamon, 1997, The Effect of Surface Roughness on Measurement of Slip Resistance, The Proceedings of the 13th Triennial Congress of the International Ergonomics Association, Tampere, Finland, Vol. 3, pp. 365-367.

4. **WR Chang**, 2000, The Effects of Surface Roughness and Contaminants on the Dynamic Friction between Porcelain Tile and Vulcanized Rubber, The Proceedings of the 14th Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Society, San Diego, California, USA, Vol. 4, pp. 494-497.

5. J Cotnam, **WR Chang,** T Courtney, 2000, A Retrospective Study of Slips, Trips and Falls across Industries, The Proceedings of the 14th Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Society, San Diego, California, USA, Vol. 4, pp. 473-476.

6. R Grönqvist, **WR Chang,** M Hirvonen, E Rajamäki, A Tohv, 2000, Validity and Reliability of Transitional Floor Friction Tests: the Effect of Normal Load and Sliding Velocity, The Proceedings of the 14th Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Society, San Diego, California, USA, Vol. 4, pp. 502-505.

7. **WR Chang,** 2001, The Slip Resistance of Common Footwear Materials Measured with Two Slipmeters, The Proceedings of the 6th Pan-Pacific Conference on Occupational Ergonomics, Beijing, China, August 21 - 24, Occupational Ergonomics, Ed. Sheng Wang and Kan Zhang, pp. 317-319.

8. **WR Chang,** CC Chang, DH Son, 2002, Friction Requirements for Different Climbing Conditions on Straight Ladders, The Proceedings of the XVIth International Annual Occupational Ergonomics and Safety Conference '2002, Toronto, Canada, June 9 - 12.

9. **WR Chang**, M Hirvonen, R Grönqvist, WM Aguilera, 2002, The Effects of Cut-Off Length on Surface Roughness Parameters and Their Correlation with Transition Friction, The Proceedings of the 46th Annual Meeting of the Human Factors and Ergonomics Society, Baltimore, Maryland, September 30 – October 4, pp. 1713-1717.

10. KW Li, CJ Chen, **WR Chang**, TK Courtney, YH Huang, A Filiaggi, KH Hsu, 2003, Field Investigation of Floor Slipperiness in the Kitchens of Western Fast Food Restaurants, Proceedings of the 10th Annual Meeting & Conference of Ergonomic Society of Taiwan (EST), pp. 422-426.

11. **WR Chang**, R Grönqvist, M Hirvonen, 2003, The Role of Surface Waviness in Friction at Shoe and Floor Interface, In PT McCabe (ed.), Contemporary Ergonomics 2003, Taylor and Francis, London, pp. 105-110.

12. **WR Chang**, CC Chang, DH Son, 2003, Available Friction and Slip Potential of Straight Ladders, The Proceedings of the 15th Triennial Congress of the International Ergonomics Association, Seoul, Korea, August 25 – 29.

13. KW Li, **WR Chang**, YH Huang, A Filiaggi, TK Courtney, 2003, Objective and Subjective Measurements of Floor Slipperiness in Fast-Food Restaurants in Taiwan, The Proceedings of the 15th Triennial Congress of the International Ergonomics Association, Seoul, Korea, August 25 – 29.

14. CC Chang, **WR Chang**, DH Son, 2003, The Effects of Straight Ladder Usage and Setup on Slippage, The Proceedings of the 15th Triennial Congress of the International Ergonomics Association, Seoul, Korea, August 25 – 29.

15. **WR Chang**, CC Chang, 2004, Using a Statistical Model to Estimate the Probability of a Slip on Portable Ladders, In PT McCabe (ed.), Contemporary Ergonomics 2004, CRC Press, Boca Raton, FL, pp. 38-42.

16. **WR Chang**, A Filiaggi, KW Li, YH Huang, TK Courtney, 2005, A Field Assessment of Potential Friction Variation in a Fast-Food Restaurant in the USA, In PD Bust and PT McCabe (ed.), Contemporary Ergonomics 2005, Taylor and Francis, London, pp. 519-523.

17. KW Li, **WR Chang**, CJ Chen, JC Wei, 2005, Friction Measurement on Inclined Surface Using the Brungraber Mark II Slipmeter, In PD Bust, PT McCabe (ed.), Contemporary Ergonomics 2005, Taylor and Francis, London, pp. 524-528.

18. **WR Chang**, CC Chang, S Matz, MF Lesch, 2006, The Statistical Distribution of Required Friction Coefficient for Level Walking, The Proceedings of the 16th Triennial Congress of the International Ergonomics Association, Maastricht, the Netherlands, July 10 – 14.

19. TK Courtney, DA Lombardi, GS Sorock, HM Wellman, S Verma, MJ Brennan, JW Collins, JL Bell, **WR Chang**, R Grönqvist, L Wolf, E DeMaster, M Matz, 2006, Slips, Trips and Falls in US Hospital Workers – Detailed Investigation, The Proceedings of the 16th Triennial Congress of the International Ergonomics Association, Maastricht, the Netherlands, July 10 – 14.

20. JW Collins, JL Bell, R Grönqvist, TK Courtney, GS Sorock, **WR Chang**, L Wolf, S Chiou, B Evanoff, 2006, Slip, Trip and Fall Prevention in Health Care Workers, The Proceedings of the 16th Triennial Congress of the International Ergonomics Association, Maastricht, the Netherlands, July 10 – 14.

21. KW Li, CC Chang, **WR Chang**, 2006, Slipping and Falling when Pulling a Hand Truck, The Proceedings of the 16th Triennial Congress of the International Ergonomics Association, Maastricht, the Netherlands, July 10 – 14.

22. **WR Chang**, YH Huang, KW Li, A Filiaggi, TK Courtney, 2006, Friction Variation in Assessing Slipperiness in Fast-Food Restaurants in the USA, The Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society, San Francisco, California, October 16 – 20, pp. 2232-2236.

23. JC Chen, **WR Chang**, BH Hatfield, DC Christiani, 2006, Characteristics of Whole-Body Vibration Frequencies and Low Back Pain in Urban Taxi Drivers, The Proceedings of the First American Conference on Human Vibration, Morgantown, West Virginia, USA, June 5 – 7, pp. 85-86.

24. **WR Chang**, SM Hsiang, 2007, An *In Situ* Observation of the Interface Kinematics between Footwear and Floor, The Proceedings of XXI Congress of the International Society of Biomechanics, Taipei, Taiwan, July 1 - 5, *Journal of Biomechanics*, Vol 40, S2, pp. S109.

25. SK Verma, DA Lombardi, **WR Chang**, TK Courtney, MJ Brennan, 2007, Circumstances of Occupational Same-Level Falls and Risk of Hip Fracture in Women over 45 Years of Age Who Fell at Work, The Proceedings of the International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Press, Hopkinton, MA, USA, August 23-24, pp. 25-29.

26. JL Bell, JW Collins, L Wolf, R Grönqvist, S Chiou, **WR Chang**, TK Courtney, GS Sorock, DA Lombardi, B Evanoff, 2007, An Evaluation of a Comprehensive Slip, Trip, and Fall (STF) Prevention Program for Hospital Workers, The Proceedings of the International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Press, Hopkinton, MA, USA, August 23-24, pp. 71-74.

27. MF Lesch, **WR Chang**, CC Chang, 2007, Reliability of Visual Cues in Predicting Judgments of Slipperiness and the Coefficient of Friction of Floor Surfaces, The Proceedings of the International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Press, Hopkinton, MA, USA, August 23-24, pp. 138-142.

28. CM Brunette, **WR Chang**, CC Chang, 2007, Determinants of Ladder Shoe Related Available Coefficient of Friction, The Proceedings of the International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Press, Hopkinton, MA, USA, August 23-24, pp. 148-152.

29. **WR Chang**, MF Lesch, CC Chang, 2007, The Effect of Contact Area on the Friction Measured with the Brungraber Mark II, The Proceedings of the International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Press, Hopkinton, MA, USA, August 23-24, pp. 153-157.

30. **WR Chang**, S Matz, R Grönqvist, M Hirvonen, 2008, Linear Regression Models of Floor Surface Parameters on Friction at Shoe-Floor Interface, In PD Bust (ed.), Contemporary Ergonomics 2008, Taylor and Francis, London, pp. 735-740.

31. JW Collins, JL Bell, R Grönqvist, TK Courtney, D Lombardi, GS Sorock, **WR Chang**, L Wolf, S Chiou, B Evanoff, HM Wellman, M Matz, A Nelson, 2008, Multidisciplinary Research to Prevent Slip, Trip and Fall (STF) Incidents among Hospital Workers, In PD Bust (ed.), Contemporary Ergonomics 2008, Taylor and Francis, London, pp. 693-698.

32. **WR Chang**, CM Brunette, CC Chang, 2009, An Objective Determination of a Slip with the PIAST, The Proceedings of the 17th Triennial Congress of the International Ergonomics Association, Beijing, China, August 10 – 14.

33. **WR Chang**, CC Chang, S Matz, 2010, Role of Transverse Shear Force in Required Coefficient of Friction, The Proceedings of the 2010 International Conference on Fall Prevention and Protection, Morgantown, WV, USA, May 19 – 20.

34. SK Verma, **WR Chang**, TK Courtney, DA Lombardi, YH Huang, MJ Brennan, MA Mittleman, MJ Perry, 2010, Slipping in U.S. Limited Service Restaurants, The Proceedings of the 2010 International Conference on Fall Prevention and Protection, Morgantown, WV, USA, May 19 – 20.

35. **WR Chang**, S Matz, CC Chang, 2010, The stochastic distribution of required coefficient of friction for level walking, The Proceedings of the Sixth World Congress of Biomechanics, Singapore, August 1 – 6, pp. 194.

36. **WR Chang**, CC Chang, S Matz, 2011, Comparison of methods to extract the required coefficient of friction for level walking, The Proceedings of the International Conference on Slips Trips and Falls, Buxton, UK, April 6 - 8.

37. **WR Chang**, S Matz, CC Chang, 2013, Comparison of Required Coefficient of Friction for Both Feet in Level Walking, In M Anderson (ed.), Contemporary Ergonomics and Human Factors 2013, Taylor and Francis, London, pp. 245 - 248.

38. **WR Chang**, S Matz, CC Chang, 2013, Available Coefficient of Friction Associated with Different Slip Probabilities for Level Walking, The Proceedings of the International Conference on Fall Prevention and Protection 2013, National Institute of Occupational Safety and Health, Japan (JNIOSH), Tokyo, pp. 247 - 250.

39. **WR Chang**, MF Lesch, CC Chang, S Matz, 2014, Factors Contributing to the Perceived Slipperiness Rating, In S Sharples and S Shorrock (ed.), Contemporary Ergonomics and Human Factors 2014, Taylor and Francis, London, pp. 49 - 52.

40. **WR Chang**, MF Lesch, CC Chang, S Matz, 2014, Factors Affecting the Perceived Slipperiness Rating, In YC Shih and SFM Liang (ed.), Bridging Research and Good Practices towards Patient Welfare: The Proceedings of the 4th International Conference on Healthcare Systems Ergonomics and Patient Safety, Taipei, Taiwan, June 23-26, Taylor and Francis, London, pp. 175-180.

41. **WR Chang**, CC Chang, MF Lesch, S Matz, 2015, Gait Adaptation on Surfaces with Different Degrees of Slipperiness, The Proceedings of the 19th Triennial Congress of the International Ergonomics Association, Melbourne, Australia, August 9 – 14.

Book

Measuring Slipperiness- Human Locomotion and Surface Factors (ed. **WR Chang**, TK Courtney, R Grönqvist, MS Redfern), Taylor & Francis, London, ISBN 0-415-29828-8, 2003.

Book Chapter

WR Chang, R Grönqvist, Slips and Falls. In: *International Encyclopedia of Ergonomics and Human Factors* (ed. W. Karwowski), Vol. 3, Part 10: Health and Safety, Taylor & Francis, London, 2001, pp. 1594-1597.

Other Publications

WS Maynard, **WR Chang**, DG Curry, 2004, Industrial Flooring, *Health and Safety International*, July, pp. 57-62.

Selected Conference Presentations

1. PL Murphy, **WR Chang**, 1997, Slips and Falls in Restaurants, 35th Risk Insurance Management Society (RIMS) Annual Conference and Exhibition, Atlanta, USA, April 13 - 18.

2. **WR Chang,** 1998, The Effect of Surface Roughness and Contaminant's Viscosity on the Dynamic Friction of Porcelain Tile, STFA '98, An International Conference on Slipping, Tripping and Falling Accidents, University of Surrey, Guildford, Surrey, UK, June 3.

3. **WR Chang,** 2000, The Evaluation of Two Commonly Used Slipmeters: The Repeatability and the Effect of Slip Criteria, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 17 - 19.

4. **WR Chang**, JP Cotnam, 2000, Field Evaluation of Two Commonly Used Slipmeters, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 17 - 19.

5. R Grönqvist, M Hirvonen, E Rajamäki, A Tohv, **WR Chang,** 2000, Measuring the Exposure to Slipping Hazards: a Novel Test Device, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 17 - 19.

6. **WR Chang**, SM Hsiang, 2000, The Interface Kinematics between Footwear and Floor Through an *In Situ* Observation, The ASME International Mechanical Engineering Congress and Exposition, Orlando, Florida, USA, November 5 - 10.

7. **WR Chang**, R Grönqvist, TB Leamon, SM Hsiang, VM Ciriello, F Fathallah, 2001, Experimental Approaches to the Prevention of Occupational Injuries Caused by Slips, Trips and Falls Accidents, Proceedings of American Academy of Forensic Sciences, Seattle, Washington, USA, February 19 - 24, Vol. 7, pp. 92.

8. JC Chen, **WR Chang,** TS Shih, WP Chang, JT Dennerlein, DC Christiani, 2001, From Hazard Identification to Exposure Prediction: Exposure Assessment of Low-Accelerating Whole-Body Vibration in Urban Taxi Drivers, Proceedings of Fourth International Scientific Conference on the Prevention of Work-Related Musculoskeletal Disorders (Premus), Amsterdam, Netherlands, September 30 - October 4, pp. 157.

9. KW Li, **WR Chang**, YH Huang, TK Courtney, A Filiaggi, KH Hsu, 2003, A Survey of Floor Slipperiness, Employees' Experiences of Slipping/Falling in Fast Food Restaurants in Taiwan, Proceedings of the First International Scientific Conference on Occupational and Environmental Health, Hanoi, Vietnam, November 12 - 14, pp. 77-78.

10. **WR Chang**, 2004, The Role of Tribology in Reducing Workers' Injuries due to Slips and Falls, American Public Health Association 132nd Annual Meeting & Exposition, Washington DC, November 6 - 10.

11. TK Courtney, YH Huang, SK Verma, **WR Chang**, KW Li, A Filiaggi, 2005, Factors Influencing US Worker Perception of Floor Slipperiness, the UK Ergonomics Society Annual Conference, Hatfield, UK, April 5 - 7.

12. **WR Chang**, KW Li, YH Huang, A Filiaggi, TK Courtney, 2005, Using Objective and Subjective Measures to Assess Floor Slipperiness in Fast-Food Restaurants in Taiwan, XVIIth World Congress on Safety and Health at Work, Orlando, Florida, September 18 - 22.

13. **WR Chang**, CC Chang, 2005, The Probability of a Slip at the Base of Portable Ladders, XVIIth World Congress on Safety and Health at Work, Orlando, Florida, September 18 - 22.

14. **WR Chang**, S Matz, CC Chang, 2008, The Stochastic Distribution of Available Friction Coefficient for Human Locomotion, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 21 - 23.

15. CC Chang, MF Lesch, **WR Chang**, 2008, Assessing Floor Slipperiness: the Effects of Friction and Perception on Gait, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 21 - 23.

16. TK Courtney, S Verma, YH Huang, **WR Chang**, KW Li, A Filiaggi, 2008, Worker Slips and Falls in Limited Service Restaurants, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 21 - 23.

17. S Verma, **WR Chang**, TK Courtney, D Lombardi, YH Huang, M Brennan, M Perry, 2008, Design, Evaluation of Multi-Modal Methods to Follow-up Multilingual Fast-Food Workers in a Prospective Cohort Injury Study, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 21 - 23.

18. J Bell, J Collins, L Wolf, R Grönqvist, S Chiou, **WR Chang**, G Sorock, TK Courtney, D Lombardi, B Evanoff, 2008, Evaluation of a Comprehensive Slip, Trip, and Fall Prevention Program for Hospital Employees, National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 21 - 23.

19. CC Chang, **WR Chang**, MF Lesch, 2009, Gait During Continuous Walking: Impact of Friction, Surface Condition, and Perception, International Society for Posture & Gait Research (ISPGR) Conference, June 21-25, Bologna, Italy.

20. **WR Chang**, CC Chang, S Matz, 2010, Role of Lateral Shear Force in the Required Coefficient of Friction for Level Walking, The Proceedings of American Academy of Forensic Sciences, Seattle, Washington, USA, February 22 - 27, Vol. 16, pp. 163-164.

21. **WR Chang,** S Matz, CC Chang, 2011, An Investigation of Stochastic Distribution of Required Coefficient of Friction for Level Walking, National Institute for Occupational Safety and Health, Morgantown, WV, USA, October 18 - 20.

22. **WR Chang,** S Matz, CC Chang, 2012, A Comparison of Required Coefficient of Friction for Both Feet in Level Walking, 4th International Conference on Applied Human Factors and Ergonomics, San Francisco, USA, July 21 - 25.

23. **WR Chang,** CC Chang, MF Lesch, S Matz, 2015, Factors Affecting the Utilized Coefficient of Friction, National Institute for Occupational Safety and Health, Kingwood, WV, USA, May 19 - 21.

Invited Presentations

1. **WR Chang**, 2005, Preventing Slips at the Bases of Portable Ladders, Department of Mechanical Engineering, National Chung-Hsing University, Taichung, Taiwan.

2. **WR Chang**, 2006, Assessing Slipperiness in Fast-Food Restaurants in the USA Using Friction Variation, Average Friction and Perception Ratings, National Institute for Occupational Safety and Health, Morgantown, WV, USA.

3. **WR Chang**, 2007, Occupational Biomechanics: Applications in Manual Material Handling, and Slips, Trips and Falls, Department of Industrial Engineering, National Tsing-Hua University, Hsinchu, Taiwan.

4. **WR Chang**, 2009, Preventing Slips at the Bases of Portable Ladders, the XXIst Annual International Occupational Ergonomics and Safety Conference, International Society for Occupational Ergonomics and Safety, Dallas, USA, June 11 - 12. (**keynote address**)

5. **WR Chang**, 2009, Multidisciplinary Approaches to Reduce Slip and Fall Incidents, International Ergonomics Conference 2009 Humanizing Work and Work Environment, Kolkata, India, December 17 – 19. (**keynote address**)

6. **WR Chang**, 2010, Slips, Trips and Falls at Work: Research and Prevention, American Society of Safety Engineers (ASSE) Boston Chapter Meeting.

7. **WR Chang**, 2011, Multidisciplinary Approaches for Measuring Slipperiness, National Chung Cheng University, Minsyong, Chiayi, Taiwan.

8. **WR Chang**, 2011, Standards, Practices and Recent Research on Slips, Trips and Falls, Institute of Occupational Safety and Health, Sijhih, Taipei, Taiwan.

9. **WR Chang**, S Leclercq, R Haslam, T Lockhart, 2013, The State of Science on Occupational Slips, Trips and Falls on the Same Level, The Proceedings of the International Conference on Fall Prevention and Protection 2013, National Institute of Occupational Safety and Health, Japan (JNIOSH), Tokyo, pp. 33 - 40. (**keynote address**)

10. **WR Chang**, 2014, Multidisciplinary Approaches for Measuring Slipperiness, University of Illinois at Urbana-Champaign.

11. **WR Chang**, 2014, Multidisciplinary Approaches for Measuring Slipperiness, National Tsing Hua University, Hsinchu, Taiwan.

12. **WR Chang**, 2014, Slips, Trips and Falls at Work: Research and Prevention, Occupational Safety and Health Council and Hong Kong Ergonomics Society, Hong Kong.

Honors & Awards

Fellow, International Ergonomics Association (IEA), 2016
Fellow, American Society of Mechanical Engineers (ASME), 2005
Fellow, The Institute of Ergonomics and Human Factors (formerly known as The Ergonomics Society), UK, 2006
William Floyd Award, The Institute of Ergonomics and Human Factors (formerly known as The Ergonomics Society), 2003
The National Occupational Research Agenda (NORA) Partnering Award for Worker Health and Safety, The National Institute for Occupational Safety and Health (NIOSH), 2006
The Best Paper Award in *Ergonomics,* 2009 (JL Bell, JW Collins, L Wolf, R Grönqvist, SS Chiou, **WR Chang**, GS Sorock, TK Courtney, DA Lombardi, B Evanoff, 2008, Evaluation of a Comprehensive Slip, Trip, and Fall Prevention Program for Hospital Employees, *Ergonomics*, 51 (12), 1906-1925.)
The Outstanding Alumni Award, National Chung-Hsing University, Taiwan, 2006
The Distinguished Alumni Award, College of Engineering, National Chung-Hsing University, Taiwan, 2011
Bravo Award, Liberty Mutual Group, 2002
Recognition Award, Digital Equipment Corporation, 1987
Summa Cum Laude, National Chung-Hsing University, 1979

Professional Memberships/Activities

The Institute of Ergonomics and Human Factors (formerly known as The Ergonomics Society), UK
Member
American Society of Mechanical Engineers (ASME)
Member
Human Factors and Ergonomics Society (HFES, USA)
Member
American Society of Testing and Materials (ASTM)

Member-at-large (2012-2015), ASTM Committee F-13 on Pedestrian/Walkway Safety and Footwear

Member, ASTM Committee D-21 on Polishes

Founder, Chair (2006-2012) and Past Chair (2012-present), the Technical Committee on Slips, Trips and Falls, International Ergonomics Association

Technical Editor of slip, trip and fall contact group website: www.slipstripsfalls.org

Conferences Organized

Organizer, An International Symposium on the Measurement of Slipperiness, Liberty Mutual Research Institute for Safety, Hopkinton, Massachusetts, USA, July 27-28, 2000.

Convenor, An International Symposium on Slip, Trip and Fall Accidents (3 sessions), the 14th Triennial Congress of the International Ergonomics Association (IEA), San Diego, USA, July 31 – August 4, 2000.

Organizer, Special Sessions on Slip, Trip and Fall Accidents (3 sessions), National Occupational Injury Research Symposium, National Institute for Occupational Safety and Health, Pittsburgh, USA, October 17-19, 2000.

Organizer, A Special Session on Slip, Trip and Fall Accidents, The 6th Pan-Pacific Conference on Occupational Ergonomics, Beijing, China, August 21 - 24, 2001.

Organizer, Special Sessions on Slip, Trip and Fall Accidents (3 sessions), the XVIth International Annual Occupational Ergonomics and Safety Conference '2002, The International Society for Occupational Ergonomics and Safety (ISOES), Toronto, Canada, June 9-12, 2002.

Organizer, An International Symposium on Slip, Trip and Fall Accidents (4 sessions), the 15th Triennial Congress of the International Ergonomics Association (IEA), Seoul, Korea, August 25 – 29, 2003.

Organizer, An International Symposium on Slip, Trip and Fall Accidents (20 papers), The Ergonomics Society Annual Conference, Swansea, UK, April 14 – 16, 2004.

Organizer, An International Symposium on Slip, Trip and Fall Accidents (31 papers), The Ergonomics Society Annual Conference, Hatfield, UK, April 5 – 7, 2005.

Organizer, An International Symposium on Slip, Trip and Fall Accidents (6 sessions), the 16th Triennial Congress of the International Ergonomics Association (IEA), Maastricht, the Netherlands, July 10 – 14, 2006.

Organizer, The International Conference on Slips, Trips and Falls 2007: From Research to Practice, The IEA Technical Committee on Slips, Trips and Falls, 39 papers, 7 sessions, Hopkinton, MA, USA, August 23-24, 2007.

Organizer, An International Symposium on Slip, Trip and Fall Accidents, 22 papers and a field trip to visit the Health Safety Laboratory (HSL), The Ergonomics Society Annual Conference, Nottingham, UK, April 1 – 3, 2008.

Organizer, An International Symposium on Slip, Trip and Fall Accidents, 25 papers and Member of Program Committee, 17th Triennial Congress of the International Ergonomics Association (IEA), Beijing, China, August 9 – 14, 2009.

Chair, Scientific Committee on Slips, Trips and Falls, The 2010 International Conference on Fall Prevention and Protection, Morgantown, WV, USA, May 19 – 20.

Co-chair and co-organizer, the International Conference on Slips Trips and Falls, Health and Safety Laboratory, Buxton, UK, 29 presentations, April 6 – 8, 2011.

Co-chair and co-organizer, the International Conference on Stairway Usability and Safety, Toronto, June 9 – 10, 2011.

Organizer, An International Symposium on Slip, Trip and Fall Accidents and Member of Program Committee, 18th Triennial Congress of the International Ergonomics Association (IEA), Recife, Brazil, February 12 – 16, 2012.

Member of Technical Programme Committee, Ergonomics and Human Factors 2012 International Conference, the Institute of Ergonomics and Human Factors, Blackpool, UK, April 16-19.

Member of Technical Programme Committee, Ergonomics and Human Factors 2013 International Conference, the Institute of Ergonomics and Human Factors, Cambridge, UK, April 15-18.

Co-chair and co-organizer, the International Conference on Fall Prevention and Protection 2013, the National Institute for Occupational Safety and Health, Japan (JNIOSH), Tokyo, Japan, 41 presentations, October 23 – 25.

Member of Technical Programme Committee, Ergonomics and Human Factors 2014 International Conference, the Institute of Ergonomics and Human Factors, Southampton, UK, April 7-10.

Member of International Advisory Committee, the 4th International Conference on Healthcare Systems Ergonomics and Patient Safety, Taipei, Taiwan, June 23-26, 2014.

Member of Technical Programme Committee, Ergonomics and Human Factors 2015 International Conference, the Institute of Ergonomics and Human Factors, Daventry, UK, April 13 – 16.

Organizer, An International Symposium on Slip, Trip and Fall Accidents and Member of Program Committee, 19th Triennial Congress of the International Ergonomics Association (IEA), Melbourne, Australia, August 9 – 14, 2015.

Member of Technical Programme Committee, Ergonomics and Human Factors 2016 International Conference, the Institute of Ergonomics and Human Factors, Daventry, UK, April 19 – 21.

Editorial Service

Measuring Slipperiness- Human Locomotion and Surface Factors (ed. **WR Chang**, TK Courtney, R Grönqvist, MS Redfern), Taylor & Francis, London, ISBN 0-415-29828-8, 2003.

Editor

Ergonomics (2010-present)

Member of Editorial Board

Ergonomics (2006-2010)
Applied Ergonomics (2014-present)
Safety Science (2011-present)
Journal of Testing and Evaluation

Guest Editor

Ergonomics, A Special Issue on the Measurement of Slipperiness, Vol. 44, No. 13, 2001, and a Special Issue on Slips, Trips and Falls, Vol. 51, No. 12, 2008.
Safety Science, Special Issues on Slips, Trips and Falls Accidents, Vol. 40, No. 7-8, 2002 and Prevention of Fall-Related Accidents, Vol. 43, No. 7, 2005.
Industrial Health, A Special Issue on Slips, Trips and Falls, Vol. 46, No. 1, 2008 and Global Cooperation for Preventions of STFs, Vol. 52, No. 5, 2014.

Associate Editor

Lubrication Engineering published by Society of Tribologists and Lubrication Engineers (STLE) (1992-1994)

Reviewer

Accident Analysis and Prevention
Age UK
Applied Ergonomics

Ergonomics
Human Factors
Human Factors and Ergonomics in Manufacturing and Service Industries
International Journal of Industrial Ergonomics
International Journal of Injury Control and Safety Promotion
International Journal of Non-Linear Mechanics
International Journal of Occupational Safety and Ergonomics
Journal of Biomechanics
Journal of NeuroEngineering and Rehabilitation
Journal of Occupational and Environmental Hygiene
Journal of Safety Research
Journal of Testing and Evaluation
Journal of Tribology
Material and Structure
Perspectives in Public Health
Safety and Health at Work
Safety Science
STLE *Tribology Transactions*
Tsinghua Science and Technology

Dissertation Committee

Santosh Kumar Verma, Risk Factors for Slipping in US Limited-service Restaurant Workers, Doctor of Science, Department of Environmental Health, School of Public Health, Harvard University, Boston, MA, USA, 2010.