FREDERIC Y.M. WAN
SHORT BIOGRAPHICAL SKETCH

NAME: Wan, Frederic Yui Ming
(eRA COMMONS user name)
Professor Emeritus of Mathematics
University of California, Irvine
Irvine, CA 92697

Affiliate Professor of Applied Mathematics
Department of Applied Mathematics
University of Washington
Seattle, WA 98109

EDUCATION: S.B. Mathematics, June, 1959
Massachusetts Institute of Technology (M.I.T.)

S.M. Mathematics, June, 1963
Massachusetts Institute of Technology (M.I.T.)

Ph.D. Mathematics, September, 1965
Massachusetts Institute of Technology (M.I.T.)

POSITIONS: Instructor of Mathematics (9/65-6/67), Assistant Professor of Applied Mathematics (7/67-6/69), Associate Professor of Applied Mathematics (7/60-6/74), Department of Mathematics, M.I.T.

Professor, Department of Mathematics & Director, Institute of Applied Mathematics & Statistics (7/74 - 6/83), University of British Columbia (U.B.C.)

Professor, Chair Designate and Chair of Applied Mathematics (7/83 – 8/87), Divisional Dean of Natural & Mathematical Sciences, College of Arts & Sciences, (9/88 – 12/92), University of Washington,

Professor, Department of Mathematics (1/95 - 6/17), Vice Chancellor for Research and Dean of Graduate Studies (95 – 00), Professor of Mechanical & Aerospace Engineering (7/95 - 6/17), Professor of Civil & Environmental Engineering (7/97 - 6/01), Faculty Athletic Representative (2000-04), Director of the Mathematical and Computational Biology (MCB) Gateway Graduate Program (9/07 –6/13) and Director of the MCB for Undergraduates (MCBU) Program (9/11 - 6/16), University of California, Irvine (UCI).

OTHERS: Various consultant position (e.g., CAMROC (Cambridge Radio Observatory Committee), MIT Lincoln Laboratory, Tupperware, Dart Industries, Army Materials and Mechanics Center at Watertown, Foster-Miller Associates, SW Industries, Flow Industries, B.C. Research, Association of Professional Engineers of British Columbia, Acrowood Corp., etc.

ARO-D (Army Research Office-Durham) Summer Scientific Advisor (a maximum of two consecutive terms)

Visiting Associate of Applied Mechanics, Division of Engineering and Applied Science, Caltech

Visiting Fellow, Department of Economics, M.I.T.

Visiting Scholar, Applied Mathematics, University of Washington, 1979 – 80

Canadian NSERC (National Science and Engineering Research Council) Committee on Pure and Applied Mathematics: Chairman 1981 - 82, concurrent with UBC appointment

Program Director, Division of Mathematical Sciences, National Science Foundation (NSF Visiting Scientist from UW)

Director, Division of Mathematical Sciences), National Science Foundation (NSF, IPA from UW)

HONORS: Sigma XI (elected Associate Member in 1963 and Member in 1965)
Fellow of American Academy of Mechanics (1982), Secretary of the Fellows (64 – 89)
Fellow of American Society of Mechanical Engineers (ASME, 1982)
Arthur Beaumont Distinguished Service Award, Canadian Applied Mathematics Society (1988)
President of American Academy of Mechanics (92 – 93), Past President (93 – 94)
Fellow of the American Association for the Advancement of Science (AAAS, 1994)
Certification of Appreciation in recognition for Outstanding Service and Achievements as Director, Division of Mathematical Sciences), National Science Foundation (1994)
Foreign Member, The Russian Academy of Natural Sciences (2000)
SIAM Fellow (2010)

AWARDS: Teaching Excellence Award, School of Physical Sciences at U.C. Irvine (UCI, 2004)
Chancellor's Award for Excellence in Fostering Undergraduate Research, UCI (2005)
Outstanding Contributions to Undergraduate Education Award, School of Physical Sciences, UCI (2006)

RESEARCH GRANTS:
Canadian NSERC Operating Grant (1975-85)
NSF Research Grant, Co-PI (1983-92)
NSF Research Grant (through a surrogate while serving as DMS Director at NSF, 1992-95)
NSF SCREMS Grant, DMS-0112416, PI, 1995-2000 (Held 12 months appointment as Research Vice Chancellor & Graduate Dean, for the period of 1995 - 2000 not eligible for research grants except for equipment grants)
PHS - NIH General Med Science P20 Grant (GM-066051, Co-PI, 2001-02)
PHS - NIH General Med Science R01 Grant (GM-67247, PI, 2002-16)
PHS - NIH General Med Science R25 Grant (GM096989, PI) for conducting an annual national short course on systems biology (2010 – 16)
NSF DMS UBM Grant DMS-1129008 for Mathematical and Computational Biology for Undergraduates (MCBU, 2011-16)

SERVICES:

MIT Educational Council

Canadian NSERC (National Science and Engineering Research Council) Committee on Pure and Applied Mathematics: Chairman 1981 - 82

Journal Associate Editorships: Studies in Applied Mathematics 1984 - 2017,
Canadian Applied Math. Quarterly (93),
International Journal of Solids and Structures (96)

Applied Mathematics Program Director, National Science Foundation (NSF), on leave
from U.W.
Visiting Committee for Mathematics, MIT
Director, Division of Mathematical Sciences, NSF, on leave from U.W.
Founding Chair of Board of Trustees, Institute for Pure and Appied Mathematics,
(IPAM), UCLA
Member of Academic Advisory Committee, Zhou Pei-Yuan Center for Applied
Mathematics (ZCAM), Tsinghua University of China
Member of the Scientific Board, Institute for Mathematical Sciences, Renmin University
of China.

SELECTED PUBLICATIONS

47. The response of a spatially distributed neuron to a white noise current injection, Biological
Cybernetics 33, 1979, 39-55. (with H.C. Tuckwell)

68. The interspike interval of a cable model neuron with white noise input, Biological
Cybernetics 49, 1984, 155-167. (with H.C. Tuckwell and Y.S. Wong)

118. Nature of equilibria and effects of drug treatments in some viral population dynamical
models, IMA J. Math. Appl. Med. & Biol. 17, 2000, 311-327. (with H.C. Tuckwell)

123. A spatial stochastic neuronal model with Ornstein-Uhlenbeck input current, Biol. Cybern.
86, 2002, 137-145. (with H.C. Tuckwell & J.-P. Rospars)

125. Do morphogen gradients arise by diffusion?, Dev. Cell, 2, 2002, 785-796. (with A.D. Lander
and Q. Nie)

126. Determination of Firing Times for the Stochastic Fitzhugh-Nagumo Neuronal Model, Neural
Comp.15, 2003, 143-159. (with H.C. Tuckwell and Rodriguez)

132. Aggregation of a distributed ligand source and morphogen gradients, Studies in Appl.
Math., 114, 2005, 343-374. (with A.D. Lander, Q. Nie and B. Varga)

133. Spatially distributed morphogen synthesis and morphogen gradient formation, Math.
Biosci. & Eng. (MBE), 2, 2005, 239-262. (with A.D. Lander and Q. Nie)

134. Formation of the BMP activity gradient in the Drosophila embryo, Dev. Cell, 8, 2005, 1-10.
(with C.M. Mizutani, Q. Nie, Y.-T. Zhang, P. Vilmos, E. Bier, J.L. Marsh and A.D. Lander)

135. Effects of Sog on Dpp-receptor binding, SIAM J. Appl. Math., 65, 2005, 1748-1771. (with Y.
Lou & Q. Nie)

136. Time to first spike in Hodgkin-Huxley stochastic systems, Physica A - Stat. Mech. Applic.,
351 (2-4), 2005, 427-438. (with H.C. Tuckwell)

137. Internalization and end flux in morphogen gradient formation, J. Comp. Appl. Math., 190,
2006, 232-251. (with A.D. Lander and Q. Nie)

138. Membrane associated non-recptors and morphogen gradients, Bulletin of Math. Bio., 69,
2007, Pgs. 33-54. (with A.D. Lander and Q. Nie)

139. Wingless directly represses DPP morphogen expression via an Armadillo/TCF/Brinker
complex, PLoS ONE, 2007, 1 (e142, doi:10.1371/journal.pone.0000142), Pgs. 1-10
[plus supplement, 1-14, and figures, S1-S6]. (with H. Theisen, A. Syed, B.T. Nguyen, T.
Lukacsovich, J. Purcell, G.P. Srivastava, D. Iron, K. Gaudenz, Q. Nie,M.L. Waterman,
and J. L. Marsh)

143. Selective pressures for and against genetic instability in cancer: a time-dependent problem, J. Royal Soc., Interface, 2007, Online, June 19, 2007, doi: 10.1098/rsif.2007.1054. (with N. Komarova and A. Sadovsky)

144. The role of feedback in the formation of morphogen territories, Math. Biosci. & Eng. , 5 (No.2), 2008, Pgs. 277 –298. (with D. Iron, A. Syed, H. Theisen, T. Lukacsovich, M. Naghibi, J.L. Marsh, and Q. Nie)

145. Compact integration factor methods in high spatial dimension, J. Comp. Phys., 227, 2008, Pgs. 5238- 5525 (with Q. Nie, F.Y.M. Wan, Y.-T. Zhang and X.-F. Liu)

146. Feedback regulation in multistage cell lineages, Math. Biosci. & Eng., 6(1), 2009, Pgs. 59-82. (W.-C. Lo, C.-S. Chou, K. Gokoffski, A.D. Lander, A.L. Calof and Q. Nie)

147. Localized ectopic expression of Dpp receptors in a Drosophila embryo, Studies in Appl. Math. 123, 2009, Pgs 175 - 214. (with A.D. Lander, Q. Nie and Y.-T. Zhang)

148. Cell lineages and the logic of proliferative control, PLoS Biology, 7(1), 2009, Pgs 1 - 17. (with A.D. Lander, K. Gokoffski, Q. Nie, and A.L. Calof)

149. The measures of success: constraints, objective, and tradeoffs in morphogen-mediated patterning, Cold Soring Harbor Perspectives. in Biol. 2009; 1:a002022. (with A.D. Lander, W.-C. Lo, and Q. Nie)

150. Genetic instability in cancer: an optimal control problem, Studies in Appl. Math., Vol. 125(1), 2010, Pgs. 1 - 10. (with A. Sadovsky and N. L. Komarova)

151. Spatial dynamics of multi-state cell lineages in tissue stratification, Biophysical J. Vol. 99 (10), 2010, Pgs. 3145-3154. (with C.-S. Chiou, W. Lo, K. Gokoffski, Y.-T.Zhang, A.D. Lander, A.L. Calof, and Q. Nie)

152. Size-normalized robustness of Dpp gradient in Drosophila wing imaginal disc, JoMMS Vol. 6 (1-4), 2011, Pgs. 321-350. (with A.D. Lander, Q, Nie, and B. Vargas)

153. Robustness of signaling gradient in Drosophila wing imaginal disc, J. DCDS-B (Discrete and Continuous Dynamical Systems, Series B) Vol. 16 (3) 2011, Pgs. 835-866. (with J. Lei, A.D. Lander, and Q. Nie)

154. Robustness of morphogen gradients with "Bucket Brigade" transport throug D. Wang,h membrane- associated non-receptors, J. DCDS-B (Discrete and Continuous Dynamical Systems, Series B) Vol. 18(3), 2013, Pgs. 721-739. (with J.-Z. Lei, D. Wang, Y. Song and Q. Nie)

155. A new approach to feedback for robust signaling gradients, Studies in Appl. Math. 133, 2014, 18-51. (with T. Kushner and A. Simonyan)

156. Cell-surface bound non-receptors and morphogen gradients, Studies in Appl. Math. 133 (2), 2014, Pgs. 151-181. (DOI: 10.1111/sapm.12030)

157. Fastest time to cancer by loss of tumor suppressor genes, Bull. Math Bio. 76. 2014, 2737-2784. (with C. Sanchez-Tapia)

158. Robust and precise morphogen-mediated patterning: trade-offs, constraints and mechanisms, Interface, J. Royal Soc. 12 . 2014, Pgs. 1014-. (with W.-C. Lo, S. Zhou, A.D. Lander and Q. Nie)

159. Transient Feedback and Robust Signaling Gradients, Int. J. Num. Anal. & Modeling, Series B, 13 (2), 2016, Pgs.175-200. (with A. Simonyan)

161. Emergent Phenomena in Science and Everyday Life (Week 4: Pattern Formation and Systems Biology), A Coursera Course, University of California, Irvine, 2016 https://www.coursera.org/learn/emergent-phenomena/home/week/4. (with J. Allard)

162. Optimal Proliferation and Differentiation of Chlamydia Trachomatis, Studies in Applied. Math. 139 (1), 2017, 129-178 (DOI: 10.1111/sapm.12175). (F.Y.M. Wan and G.A. Enciso).

163. Dynamical System Models in the Life Sciences and their scientific issues, World Scientific, Singapore, New Jersey, etc. , 2017

164. Progressive decrease in Chlamydia cell size precedes differentiation, Nature Communications, (2018) 9:45, DOI: 10.1038/s41467-017-02432-0. (with J.K. Lee, G.A. Enciso, D. Boassa, C.N. Chander, T.H. Lou, S.S. Pairawan. M.C. Guo, M.J. Ellisman, C. Suetterlin and Ming Tan)

165. Mathematical Models and Their Analysis, SIAM Classics Series in Applied Mathematics, #79, SIAM, Philadelphia, 2018.

166. The necessity and benefits of multiple feedback for robust biological development, Stud. in Appl. Math. 143 (1), 2019, 3-41. (https://doi.org/10.1111/sapm.12258)

167. Stochastic Models in the Life Sciences and their methods of analysis, World Scientific, New Jersey, 2019.

168. Regulatory feedback on receptor and non-receptor synthesis for robust signaling, Dev. Dyn., 249 (3), 2020: 383-409. (Special Issue: 50 Years of Positional Information in Development, Disease & Regeneration, https://doi.org/10.1002/dvdy.160, with A.D. Lander, Q. Nie, C. Sanchez-Tapia and A. Simonyan).

169. Stochastic Chlamydia Dynamics and Optimal Spread, Bull Math Biol 83, 24 (2021). https://doi.org/10.1007/s11538-020-00846-4. (with G.A. Enciso, C. Sutterlin and M. Tan)

170. Spatially-Varying Multi-feedback for Robust Signaling, Stud. in Appl. Math. 147 (3), 2021: 1058-1088. (http://dx.doi.org/10.1111/sapm.12424).

171. Spatial Dynamics Models in the Life Sciences and Feedback in Robust Biological Development, World Scientific, New Jersey, (January) 2023.

172. Growth of RB Population in the Conversion Phase of Chlamydia Life Cycle, Comm. Apple. Math. & Comp. (CAMC), 2023 (https://doi.org/10.1007/s42967-022-00226-w).