

XIAOLAN XU

◆ Jet Propulsion Laboratory, M/S 300-329, 4800 Oak Grove Dr., Pasadena, CA 91109

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EXPERTISE

Expertise in the field of applied electromagnetics, electromagnetic wave propagation and scattering properties from ocean surface, vegetated land surface and snow covered terrain, forward modeling and retrieval algorithm development with applications to Earth remote sensing in space.

EDUCATION

University of Washington, Seattle, WA, USA 09/2006 - 12/2011

Ph. D. in Electrical Engineering

- Science Communication Fellow, Pacific Science Center (PSC)
- Organizing Committee member, Progress in Electromagnetics Research Symposium (PIERS), Boston, 2010
- Second Prize, Student Paper Competition, IEEE International Geoscience & Remote Sensing Symposium, Cape Town, South Africa, 2009

M. S. in Electrical Engineering (GPA: 3.86/4.00) 09/2006 - 06/2008

Zhejiang University, Hangzhou, Zhejiang, China 09/2002 - 06/2006

Bachelor of Engineering in Electrical Engineering (GPA: 3.94/4.00)

- Member of Chu Kochen Honors College (Top 5% students, Honors Program of Engineering)
- Outstanding Bachelor Thesis

EMPLOYMENT

Jet Propulsion Laboratory, Pasadena, CA, USA 02/2014 - present

Scientist, Engineering & Science Directorate

- Lead developer for Freeze/Thaw algorithm (L2/3-FT-A) for Soil Moisture Active Passive satellite mission
- Support optional algorithm and data cubes (L2-SM-A) for Soil Moisture Active Passive (SMAP) satellite mission
- Develop methods for estimating reflectance from bistatic scattering of digital communication satellite Signals of Opportunity (SoOps) across the available microwave spectrum, from VHF to Ka band.
 - SoOp Field Campaign: Equipment Deployment, Hardware Assembling and Ground Measurement Sampling

Jet Propulsion Laboratory, Pasadena, CA, USA 01/2012-02/2014

Postdoctoral Fellow, Engineering & Science Directorate

- Develop and implement data cubes (L2-SM-A) for Soil Moisture Active Passive (SMAP) satellite mission
- Implement incidence angle correction algorithm for UAVSAR data of SMAPVEX 12
- Analyze post-launch Aquarius data for various applications including snow coverage, freeze/thaw detection and land cover classification
- Improve and validate the forward bicontinuous snow model

University of Washington, Seattle, WA, USA 09/2006 - 12/2011

Research Assistant, Laboratory of Applications and Computations in Electromagnetics and Optics (LACEO)

- Extended dense media radiative theory to multilayer structure for snow application
- Derived bi-continuous model of terrestrial snow and code implementation
- Developed Foldy-Lax fast algorithm for multiple scattering of spheres
- Implemented MoM-BOR code for axis symmetric structure with application on vegetation scattering
- Enhanced hydrology models with data assimilation using active and passive microwave remote sensing
- Improved forward physical scattering model for different land cover and ocean surface
- Field experiments
 - Ground active and passive snow experiment, Mar. 2011 & Feb. 2009

- Grand Mesa snow pre-season survey, Sep. 2010
- Grand Mesa snow in-season survey, Nov. 2010

Zhejiang University, Hangzhou, Zhejiang, China

08/2004 - 06/2006

Research Assistant, Remote Sensing & Wireless Communication Lab

- Developed models of ocean rough surface scattering (1D/2D)

TEACHING EXPERIENCE

University of Washington, Seattle, WA, USA

Winter, 2011

Lecturer, Department of Electrical Engineering

- EE361 "Applied Electromagnetics"

University of Washington, Seattle, WA, USA

Spring, 2008

Teaching Assistant, Department of Electrical Engineering

- EE575 "Waves in Random Media"

TECHNICAL SKILLS

- Software: HFSS, Designer, CST, Cadence, Spice, ADS
- Programming: Matlab, C, FORTRAN, Java, LabVIEW
- Measurement: Network Analyzer, Spectrum Analyzer

PUBLICATIONS

Journal Articles

Xiaolan Xu, C. Derksen, S. H. Yueh, R. S. Dunbar and A. Colliander, "Freeze/Thaw Detection and Validation Using Aquarius' L-Band Backscattering Data," in *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 9, no. 4, pp. 1370-1381, April 2016.

S. Tan, C. Xiong, **Xiaolan Xu**, L. Tsang, "Uniaxial Effective Permittivity of Anisotropic Bicontinuous Random Media Using NMM3D," *Geoscience and Remote Sensing Letters, IEEE*, accepted.

W. Chang, K. H. Ding, L. Tsang and **Xiaolan Xu**, "Microwave Scattering and Medium Characterization for Terrestrial Snow With QCA-Mie and Bicontinuous Models: Comparison Studies," in *IEEE Transactions on Geoscience and Remote Sensing*, vol. 54, no. 6, pp. 3637-3648, June 2016

Huantin Huang, Seung-bum Kim, Leung Tsang, **Xiaolan Xu**, Tien-Hao Liao, Thomas J. Jackson, Simon Yueh, "Coherent Model of L-Band Radar Scattering by Soybean Plants: Model Development, Validation and Retrieval," *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol. PP, no. 99, pp. 1-1, 2015.

Seung-bum Kim, Thomas Jackson, Simon Yueh, **Xiaolan Xu**, Scott Hensley, "Feasibility of inter-comparing airborne and spaceborne observations of radar backscattering coefficients," *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol. 8, no. 7, pp. 3507-3519, July 2015.

Wenmo Chang; Shurun Tan; Lemmetyinen, J.; Leung Tsang; **Xiaolan Xu**; Yueh, S.H., "Dense Media Radiative Transfer Applied to SnowScat and SnowSAR," in *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol. 7, no. 9, pp. 3811-3825, Sept. 2014.

Kim, S.-B.; Moghaddam, M.; Tsang, L.; Burgin, M.; **Xiaolan Xu**.; Njoku, E.G., "Models of L-Band Radar Backscattering Coefficients Over Global Terrain for Soil Moisture Retrieval," *Geoscience and Remote Sensing, IEEE Transactions on*, vol. 52, no. 2, pp. 1381-1396, February 2014.

Colliander, A.; **Xiaolan Xu**, "Normalized Residual Scattering Index Applied to Aquarius L-Band Measurements," *Geoscience and Remote Sensing Letters, IEEE*, vol. 10, no. 4, pp. 890,894, July 2013.

Leung Tsang; Il-Suek Koh; Tien-Hao Liao; Shaowu Huang; **Xiaolan Xu**; Njoku, E.G.; Kerr, Y.H., "Active and Passive Vegetated Surface Models With Rough Surface Boundary Conditions From NMM3D," *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of* , vol.6, no.3, pp.1698,1709, June 2013.

Leung Tsang; Kung-Hau Ding; Shaowu Huang; **Xiaolan Xu**, "Electromagnetic Computation in Scattering of Electromagnetic Waves by Random Rough Surface and Dense Media in Microwave Remote Sensing of Land Surfaces," *Proceedings of the IEEE* , vol.101, no.2, pp.255,279, Feb. 2013.

Xiaolan Xu, L. Tsang, S. Yueh, "Electromagnetic Models of Co/Cross-polarization of Bicontinuous/DMRT in Radar Remote Sensing of Terrestrial Snow at X- and Ku-band for CoReH₂O and SCLP Applications," *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of* , vol.5, no.3, pp.1024-1032, June 2012

Xiaolan Xu, Ding Liang, Leung Tsang, Andreadis, K.M., Josberger, E.G., Lettenmaier, D.P., Cline, D.W., Yueh, S.H., "Active Remote Sensing of Snow Using NMM3D/DMRT and Comparison With CLPX II Airborne Data," *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of* , vol.3, no.4, pp.689-697, Dec. 2010.

Kung-Hau Ding, **Xiaolan Xu**, Leung Tsang, "Electromagnetic Scattering by Bicontinuous Random Microstructures With Discrete Permittivities," *Geoscience and Remote Sensing, IEEE Transactions on* , vol.48, no.8, pp.3139-3151, Aug. 2010.

Ding Liang, **Xiaolan Xu**, Leung Tsang, Andreadis, K.M., Josberger, E.G., "The Effects of Layers in Dry Snow on Its Passive Microwave Emissions Using Dense Media Radiative Transfer Theory Based on the Quasicrystalline Approximation (QCA/DMRT)," *Geoscience and Remote Sensing, IEEE Transactions on* , vol.46, no.11, pp.3663-3671, Nov. 2008.

Wenzhe Yan, **Xiaolan Xu**, Yang Du, F. Sheng, Z. N. N., "Two-scale Model for Composite Rough Surface Scattering," *PIERS ONLINE*, Vol. 3, No. 5, 2007.

Doctoral Thesis

Xiaolan Xu, "Electromagnetic Scattering Properties in Random Media and Its Application in Snow Remote Sensing," University of Washington, 2011.

Conference Papers

Xiaolan Xu, Simon Yueh, Rashmi Shah, James Garrison, Yunjin Kim, Abi Komanduru, and Kelly Elder, "Multi-Frequency Bistatic Reflectometry Modeling over Terrestrial Snow using Signals of Opportunity," *Geoscience and Remote Sensing Symposium, 2015 IEEE International, IGARSS 2015*, accepted.

Xiaolan Xu, Leung Tsang, Josberger, E.G., "Dense media radiative transfer theory for passive remote sensing and application to SWE Retrieval," *Microwave Radiometry and Remote Sensing of the Environment (MicroRad), 2010 11th Specialist Meeting on* , vol., no., pp.110-115, 1-4 March 2010

Xiaolan Xu, Ding Liang, Andreadis, K.M., Leung Tsang, Josberger, E.G., "Comparison with CLPX II airborne data using DMRT model," *Geoscience and Remote Sensing Symposium, 2009 IEEE International, IGARSS 2009* , vol.2, no., pp.II-148-II-151, 12-17 July 2009

Ding Liang, Leung Tsang, Simon Yueh, **Xiaolan Xu**, "Modeling Active Microwave Remote Sensing of Multilayer Dry Snow using Dense Media Radiative Transfer Theory," *Geoscience and Remote Sensing Symposium, 2008. IGARSS 2008. IEEE International*, vol.3, no., pp.III-39-III-42, 7-11 July 2008

Leung Tsang, Ding Liang, **Xiaolan Xu**, Peng Xu, "Microwave emission from snowpacks: modeling the effects of volume scattering, surface scattering and layering," *Microwave Radiometry and Remote Sensing of the Environment, 2008. MICRORAD 2008*, vol., no., pp.1-4, 11-14 March 2008

Ding Liang, **Xiaolan Xu**, Leung Tsang, Andreadis, K.M., Josberger, E.G., "Modeling multi-layer effects in passive microwave remote sensing of dry snow using Dense Media Radiative Transfer Theory (DMRT) based on quasicrystalline approximation," *Geoscience and Remote Sensing Symposium, 2007. IGARSS 2007. IEEE International*, vol., no., pp.1215-1218, 23-28 July 2007

Yan, W., **Xiaolan Xu**, Du, Y., Sheng, F., Li, Z., Kong, J., "A Two-Scale Model for Composite Rough Surface Bistatic Scattering," *Geoscience and Remote Sensing Symposium, 2006. IGARSS 2006. IEEE International Conference on*, vol., no., pp.2939-2941, July 31 2006-Aug. 4 2006

HONORS/AWARDS

- Team Bonus Award, Soil Moisture Active and Passive Mission Science Algorithm Team, JPL 2014
- Second Prize, Student Paper Competition, IEEE International Geoscience and Remote Sensing Symposium 2009
- Excellent Student Scholarship, Zhejiang University 2003/2004/2005
- Excellent Student Leader, Zhejiang University 2003/2004/2005
- Scholarship for Creative Activity, Zhejiang University 2005
- Third Prize in National Collegiate Mathematical Modeling Competition 2004

PROFESSIONAL ACTIVITIES

- Session Chair, IEEE Transactions on Geoscience and Remote Sensing, 2015
- Organizing Committee, Progress in Electromagnetics Research Symposium (PIERS) in Boston, 2010
- Reviewer, IEEE Geoscience and Remote Sensing Letters, since 2010
- Reviewer, IEEE Transactions on Geoscience and Remote Sensing, since 2009
- Reviewer, IEEE International Geoscience and Remote Sensing Symposium, 2009 ~ 2012, 2015
- Reviewer, PIER & JEMWA, 2010
- Reviewer, Proceedings of the IEEE, since 2009

MEMBERSHIP

- Member, American Geophysical Union
- Member, IEEE Geoscience & Remote Sensing Society
- Member, Institute of Electrical and Electronics Engineers (IEEE)
- Student Member, IEEE, 2008~2011