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Kevin L. Graf, Ph.D., P.E.

Managing Engineer | Electrical Engineering & Computer Science
149 Commonwealth Drive | Menlo Park, CA 94025
(650) 688-7357 tel | kgraf@exponent.com

Professional Profile

As a licensed electrical engineer and active member of the International Committee on Electromagnetic Safety, Dr. Graf specializes in the analysis of electric and magnetic fields and waves at radio frequencies and below - including analysis of medical devices, consumer electronics, high voltage transmission lines, and natural emissions, with comparisons to guidelines for electromagnetic exposure, interference (EMI) and compatibility (EMC). He is experienced in both computational modeling and field measurements, and also has significant experience with data analysis and visualization.

In his doctoral research, he assessed the effects of very low frequency transmitters on the ionosphere and magnetosphere, as well as implications for geomagnetically-trapped radiation and space vehicles. His work has included significant hands-on experience with the acquisition and analysis of experimental data, the use of both commercial and in-house computational modeling software, coordination of large-scale remote sensing experiments, and the installation and maintenance of electronic systems in remote and extreme environments. This work has also included significant theoretical analysis of electric and magnetic fields and waves, currents and voltages, and their interactions with dielectrics, conductors, plasmas, and energetic particles.

Dr. Graf has also been a key figure in coordinating scientific outreach to developing countries through the United Nations International Space Weather Initiative program, installing and overseeing the maintenance of remote research stations, cultivating the development of both individual researchers and research programs into new areas of science, and coordinating international collaboration on global scientific questions.

Dr. Graf has performed finite element analysis (FEA) in COMSOL Multiphysics and finite-difference time-domain (FDTD) and finite-difference frequency-domain (FDFD) analysis in Sim4Life as well as in-house software. Dr. Graf is also proficient with MATLAB and has experience with C, C++, Fortran 90, Fortran 77, Open MP, MPI, Perl, and Python.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, Stanford University, 2014

M.S., Electrical Engineering, Stanford University, 2012

B.S., Electrical and Computer Engineering, Cornell University, summa cum laude, 2007

Outstanding Student Paper Award, AGU Fall Meeting, 2012

Achievement Rewards for College Scientists Scholar, Stanford University, 2011

Stanford Graduate Fellowship in Engineering and the Sciences, Stanford University, 2007

Merrill Presidential Scholar, Cornell University, 2007

Licenses and Certifications

Licensed Professional Electrical Engineer, California, #21433

Publications

Graf KL. FE Electrical Review Course: Communications Module, Capstone Learning Associates, 2015.

Graf KL, Spasojevic M, Marshall RA, Lehtinen NG, Foust FR, Inan US. Extended lateral heating of the nighttime ionosphere by ground-based VLF transmitters. Journal of Geophysical Research 2013; 118. doi:10.1002/2013JA019337.

Graf KL, Lehtinen NG, Spasojevic M, Cohen MB, Marshall RA, Inan US. Analysis of experimentally-validated trans-ionospheric attenuation estimates of VLF signals. Journal of Geophysical Research 2013; 118. doi:10.1002/jgra.50228.

Salut MM, Cohen MB, Ali MAM, Graf KL, Cotts BRT, Kumar S. On the relationship between lightning peak current and early VLF perturbations. Journal of Geophysical Research 2013; 118. doi:10.1002/2013JA019087.

NaitAmor S, Cohen MB, Cotts BRT, Ghalila H, AlAbdoadaim MA, Graf K. Characteristics of long recovery early VLF events observed by the North African AWESOME Network. Journal of Geophysical Research 2013; 118. doi:10.1002/jgra.50448.

Salut MM, Abdullah M, Graf KL, Cohen MB, Cotts BRT, Kumar S. Long recovery VLF perturbations associated with lightning discharges. Journal of Geophysical Research 2012; 117(A8). doi:10.1029/2012JA017567.

Bell TF, Graf KL, Inan US, Piddyachiy D, Parrot M. DEMETER observations of ionospheric heating by powerful VLF transmitters. Geophysical Research Letters 2011; 38:L11103. doi:10.1029/2011GL047503.

Graf KL, Inan US, Spasojevic M. Transmitter-induced modulation of subionospheric VLF signals: Ionospheric heating rather than electron precipitation. Journal of Geophysical Research 2011; 116:A12. doi:10.1029/2011JA016996.

Graf KL, Inan US, Piddyachiy D, Kulkarni P, Parrot M, Sauvaud JA. DEMETER observations of transmitter-induced precipitation of inner radiation belt electrons. Journal of Geophysical Research 2009; 114:A07205. doi:10.1029/2008JA013949.

Conference Papers and Presentations

Chou CK, Petersen R, Foster K, Hirata A, Ziskin M, Reilly JP, Tell R, Faraone A, Klauenberg BJ, Kavet R, Graf K, Cleveland R, Thansandote A, Bushberg J, Bailey W, Osepchuk J, Legros A, Yamazaki K, Bodemann R. Revision of IEEE Standards C95.1-2005 and C95.6-2002. BioEM2018 - Joint Annual Meeting of The Bioelectromagnetics Society and the European BioElectromagnetics Association, Piran, Portorož, Slovenia, June 29, 2018.

Graf KL, Lehtinen NG, Spasojevic M. Transionospheric attenuation of terrestrial VLF signals: Analysis and updated estimates. American Geophysical Union Fall 2012 Meeting, San Francisco, CA, December

2012.

Graf KL, Inan US, Spasojevic M, Marshall RA. Extended heating of the nighttime D region by very low frequency transmitters. American Geophysical Union Fall 2011 Meeting, San Francisco, CA, December 2011.

Graf KL, Inan US, Spasojevic M. Extended heating of the nighttime D region by very low frequency transmitters. International Union of Radio Science/General Assembly and Scientific Symposium, Istanbul, Turkey, August 2011.

Graf KL, Bell TF, Piddyachiy D, Inan US, Lehtinen NG, Parrot M. DEMETER observations of ionospheric heating by powerful VLF transmitters. American Geophysical Union Fall 2010 Meeting, San Francisco, CA, December 13-17, 2010.

Salut M, Abdullah M, Graf KL. Detecting subionospheric early VLF perturbations at Malaysia. Asia Pacific Symposium of Applied Electromagnetics and Mechanics, Kuala Lumpur, Malaysia, July 28-30, 2010.

Graf KL, Inan US, Bell TF, Foust FR, Lehtinen NG, Parrot M. Ionospheric plasma density and temperature variations produced above powerful VLF transmitters and their effects upon propagating VLF waves. RF Ionospheric Interactions Workshop, Santa Fe, NM, April 2010.

Graf KL, Lehtinen NG, Inan US. Reevaluating subionospheric detection of transmitter-induced electron precipitation. International Union of Radio Science/National Radio Science Meeting, Boulder, CO, January 6-9, 2010.

Lehtinen NG, Cohen MB, Graf KL, Inan US. VLF signatures of D-region disturbances. International Union of Radio Science/National Radio Science Meeting, Boulder, CO, January 6-9, 2010.

Graf KL, Lehtinen NG, Inan US. Reevaluating subionospheric detection of transmitter-induced precipitation of inner radiation belt electrons. American Geophysical Union Fall 2009 Meeting, San Francisco, CA, December 14-18, 2009.

Graf KL, Inan US. Observation of VLF transmitter-induced precipitation of inner radiation belt electrons. Geospace Environment Modeling Summer Workshop, Midway, Utah, June 22-27, 2008.

Graf KL, Inan US. Observation of VLF transmitter-induced precipitation of inner radiation belt electrons. International Union of Radio Science/National Radio Science Meeting, Boulder, CO, January 3-6, 2008.