Laser Radar Technology and Applications XIV

Monte D. Turner
Gary W. Kamerman
Editors

15–16 April 2009
Orlando, Florida, United States

Sponsored and Published by
SPIE

Volume 7323

Proceedings of SPIE, 0277-786X, v. 7323

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.
## Contents

### 3D IMAGING LIDAR

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7323 02</td>
<td>Echo digitizing imaging lidar for rendezvous and docking</td>
<td>M. Pfennigbauer, RIEGL Laser Measurement Systems GmbH (Austria); B. Möbius, Jena-Optronik GmbH (Germany); J. Pereira do Carmo, European Space Agency, ESTEC (Netherlands)</td>
</tr>
<tr>
<td>7323 03</td>
<td>Eyesafe ladar testbed with coaxial color imager</td>
<td>R. T. Pack, J. Swasey, R. Fullmer, S. Budge, P. Israelsen, B. Petersen, Utah State Univ. (United States); D. Cook, NAVAIR Weapons Division (United States)</td>
</tr>
<tr>
<td>7323 04</td>
<td>Waveform comparison for coherent ladar imaging using a helicopter facet model target</td>
<td>D. G. Youmans, SPARTA, Inc. (United States)</td>
</tr>
<tr>
<td>7323 07</td>
<td>Integration of 3D and 2D imaging data for assured navigation in unknown environments: initial steps</td>
<td>E. Dill, M. Uijt de Haag, Ohio Univ. (United States)</td>
</tr>
<tr>
<td>7323 08</td>
<td>Detection of concealed objects with a mobile laser scanning system</td>
<td>M. Pfennigbauer, P. Rieger, N. Studnicka, A. Ullrich, RIEGL Laser Measurement Systems GmbH (Austria)</td>
</tr>
</tbody>
</table>

### MODELING LASER RADAR I

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7323 09</td>
<td>A method for automatic reconstruction 3D models</td>
<td>L. Zhu, Beijing Normal Univ. (China) and Beijing Univ. of Civil Engineering and Architecture (China); K. Zhou, R. Shi, Beijing Univ. of Civil Engineering and Architecture (China)</td>
</tr>
<tr>
<td>7323 0A</td>
<td>Fundamental relationships inherent to lidar waveforms for classification</td>
<td>A. Neuenschwander, L. Magruder, Univ. of Texas at Austin (United States); A. Londo, Mississippi State Univ. (United States); S. Tweddle, U.S. Army Corps of Engineers (United States)</td>
</tr>
<tr>
<td>7323 0B</td>
<td>Design and validation of the eyesafe ladar testbed (ELT) using the LadarSIM system simulator</td>
<td>K. D. Neilsen, S. E. Budge, R. T. Pack, R. R. Fullmer, Utah State Univ. (United States); T. D. Cook, NAVAIR Weapons Division (United States)</td>
</tr>
</tbody>
</table>
MODELING LASER RADAR II

7323 0C Data simulation of an airborne lidar system [7323-11]
S. Kim, S. Min, G. Kim, I. Lee, C. Jun, The Univ. of Seoul (Korea, Republic of)

7323 0D Photographic-based target models for lidar applications [7323-12]
J. T. Jack, Lockheed Martin Missiles and Fire Control (United States); W. H. Delashmit, Univ. of North Texas (United States)

PHOTON-COUNTING 3D LIDAR

7323 0E Present and future space applications of photon-counting lidars [7323-13]
J. J. Degnan, Sigma Space Corp. (United States)

7323 0H Photon-counting lidar for aerosol detection and 3D imaging [7323-18]
R. M. Marino, J. Richardson, R. Garnier, D. Ireland, L. Bickmeier, C. Siracusa, P. Quinn, MIT Lincoln Lab. (United States)

FOLIAGE POKE-THROUGH IMAGING LIDAR

7323 0I Effects of lidar point density on bare earth extraction and DEM creation [7323-22]
A. M. Puetz, R. C. Olsen, B. Anderson, Naval Postgraduate School (United States)

7323 0K Research on target accuracy for ground-based lidar [7323-47]
L. Zhu, State Key Lab. of Remote Sensing Science (China) and Beijing Univ. of Civil Engineering and Architecture (China); R. Shi, Beijing Univ. of Civil Engineering and Architecture (China)

7323 0L Lidar full-waveform data analysis for detection of faint returns through obscurants [7323-25]
L. A. Magruder, A. L. Neuenschwander, The Univ. of Texas at Austin (United States)

SPARSE AND SYNTHETIC APERTURE LIDAR

7323 0M Increasing mid-frequency contrast in sparse aperture optical imaging systems [7323-26]
A. J. Stokes, B. D. Duncan, Univ. of Dayton (United States); M. P. Dierking, Air Force Research Lab. (United States); N. J. Miller, Univ. of Dayton (United States)

7323 0N Multiple chirp sparse frequency LFM lidar signals [7323-27]
R. V. Chimenti, Univ. of Dayton (United States); M. P. Dierking, Air Force Research Lab. (United States); P. E. Powers, J. W. Haus, Univ. of Dayton (United States)

7323 0O Monte Carlo simulation of the effects of pulse and platform jitter on holographic aperture lidar systems [7323-28]
J. W. Stafford, Univ. of Dayton (United States); B. D. Duncan, M. P. Dierking, Air Force Research Lab. (United States)
AEROSOL AND ATMOSPHERIC SENSING

Performance bounds of the phase gradient autofocus algorithm for synthetic aperture ladar [7323-29]
P. Gatt, D. Jacob, B. Bradford, J. Marron, B. Krause, Lockheed Martin Coherent Technologies (United States)

Aerosol elastic scatter signatures in the near- and mid-wave IR spectral regions [7323-30]
J. M. Richardson, J. C. Aldridge, A. B. Milstein, J. J. Lacirignola, MIT Lincoln Lab. (United States)

Multi-wavelength multi-angular lidar for aerosol characterization [7323-31]
A. M. Wyant, D. M. Brown, P. S. Edwards, The Pennsylvania State Univ. (United States);
C. R. Philbrick, The Pennsylvania State Univ. (United States) and North Carolina State Univ. (United States)

Supercontinuum laser sensing of atmospheric constituents [7323-32]
P. S. Edwards, A. M. Wyant, D. M. Brown, Z. Liu, The Pennsylvania State Univ. (United States);
C. R. Philbrick, The Pennsylvania State Univ. (United States) and North Carolina State Univ. (United States)

System performance and modeling of a bioaerosol detection lidar sensor utilizing polarization diversity [7323-33]
J. J. Glennon, T. Nichols, P. Gatt, T. Baynard, J. H. Marquardt, Lockheed Martin Coherent Technologies (United States);
R. G. Vanderbeek, U.S. Army Edgewood Chemical and Biological Ctr. (United States)

High-speed laser wavelength agility, stabilization, and locking for heterodyne detection differential scatter lidar [7323-34]
D. F. Pierrottet, G. E. Busch, B. W. Barnes, T. D. Jones, Coherent Applications, Inc. (United States);
R. Moon, U.S. Army Edgewood Chemical and Biological Ctr. (United States)

EMERGING LADAR APPLICATIONS AND TECHNOLOGY I

Narrow linewidth fiber laser systems via Brillouin-tailored optical fiber [7323-36]
P. D. Dragic, Neolight Technologies LLC (United States)

Low-cost compact lidar sensor for ground robots [7323-37]
B. L. Stann, J. F. Dammann, M. M. Giza, R. R. Gregory, Army Research Lab. (United States);
P.-S. Jian, Aerotek Inc. (United States); W. B. Lawler, Army Research Lab. (United States)

Identification of air and sea-surface targets with a laser range profiler [7323-38]
J. C. van den Heuvel, R. M. Schoemaker, R. H. M. A. Schieljpen, TNO Defense, Security and Safety (Netherlands)

Wideband dual-frequency lidar-radar for simultaneous velocity and high-resolution range profile measurements [7323-39]
G. Pillet, L. Morvan, D. Dolli, J.-P. Huignard, Thales Research & Technology (France)
Snapshot active polarimetric and multispectral laboratory demonstrator [7323-40]
A. Bénière, Thales Research & Technology (France) and Lab. Charles Fabry de l'Institut d'Optique, CNRS, Univ. Paris-Sud (France); M. Alouini, Thales Research & Technology (France) and Institut de physique de Rennes, CNRS, Univ. Rennes 1 (France); F. Goudail, Lab. Charles Fabry de l'Institut d'Optique, CNRS, Univ. Paris-Sud (France); A. Grisard, J. Bourderionnet, D. Dolfi, Thales Research & Technology (France); I. Baarstad, T. Løke, P. Kaspersen, Norsk Elektro Optikk A/S (Norway); X. Normandin, G. Berginc, Thales Optronique S.A. (France)

Flight test performance of a high precision navigation Doppler lidar [7323-41]
D. Pierrottet, Coherent Applications, Inc. (United States); F. Amzajerdian, L. Petway, B. Barnes, G. Lockard, NASA Langley Research Ctr. (United States)

ColorDazl/Daylight Dazzler and eye protection [7323-43]

Off-axis laser warning sensor [7323-44]
D. Goular, J. P. Cariou, D. Fleury, C. Planchat, R. Gouyon, C. Besson, ONERA (France); A. Bêche, V. Megaides, Thales Optronique France (France)
Conference Committee

Symposium Chair

Ray O. Johnson, Lockheed Martin Corporation (United States)

Symposium Cochair

Michael T. Elsmann, Air Force Research Laboratory (United States)

Conference Chairs

Monte D. Turner, Defense Advanced Research Projects Agency (United States)
Gary W. Kamerman, FastMetrix, Inc. (United States)

Program Committee

Ravil R. Agishev, Kazan State University (Russian Federation)
Phillip Gatt, Lockheed Martin Coherent Technologies (United States)
Jeffrey W. Grantham, Northrop Grumman Corporation (United States)
Clarke E. Harris, FastMetrix, Inc. (United States)
Robert O. Hauge, National Reconnaissance Office (United States)
Richard M. Heinrichs, MIT Lincoln Laboratory (United States)
James C. Lamoreux, NASA Johnson Space Center (United States)
Vasyl Molebny, National Taras Shevchenko University of Kyiv (Ukraine)
William A. Neuman, Lawrence Livermore National Laboratory (United States)
Vladimir L. Pavlovitch, Polus Research and Development Institute (Russian Federation)
C. Russell Philbrick, The Pennsylvania State University (United States)
Michael W. Roth, Johns Hopkins University (United States)
Jean-Robert Simard, Defence Research and Development Canada (Canada)
Upendra N. Singh, NASA Langley Research Center (United States)
Bevan D. Staple, Ball Aerospace & Technologies Corporation (United States)
Ove K. Steinvall, Swedish Defence Research Agency (Sweden)
David M. Tratt, The Aerospace Corporation (United States)

Session Chairs

3D Imaging Lidar
Monte D. Turner, Defense Advanced Research Projects Agency (United States)
Modeling Laser Radar I
Gary W. Kamerman, FastMetrix, Inc. (United States)

Modeling Laser Radar II
Gary W. Kamerman, FastMetrix, Inc. (United States)

Photon-counting 3D Lidar
Richard M. Marino, MIT Lincoln Laboratory (United States)

Foliage Poke-through Imaging Lidar
Monte D. Turner, Defense Advanced Research Projects Agency (United States)

Sparse and Synthetic Aperture Lidar
Phillip Gatt, Lockheed Martin Coherent Technologies (United States)

Aerosol and Atmospheric Sensing
Gary W. Kamerman, FastMetrix, Inc. (United States)

Emerging Ladar Applications and Technology I
Monte D. Turner, Defense Advanced Research Projects Agency (United States)

Emerging Ladar Applications and Technology II
Gary W. Kamerman, FastMetrix, Inc. (United States)