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Optics theory and practice in Iberoamerica: introduction to the feature issue

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This feature issue of Applied Optics (AO) on Optics Theory and Practice in Iberoamerica (OTPI) collects significantly expanded refereed papers presented at the multiconference RIAO-OPTILAS-MOPM, held in Cancún, Mexico, Sept. 23–27, 2019. All authors who participated at the conference were contacted and invited to contribute to this special issue. Furthermore, the AO dedicated issue on OTPI was open to contributions from other practitioners in all related areas, through a call for papers published in AO.

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1. INTRODUCTION

This feature issue on "Optics Theory and Practice in Iberoamerica" contains extended versions of results communicated in conjunction with the *X* Iberoamerican Optics Meeting (RIAO), the XIII Latinoamerican Meeting in Optics, Lasers, and Applications (OPTILAS), and the Mexican Optics and Photonics Meeting (MOPM) held in Cancún, Mexico, on Sept. 23–27, 2019, as well as contributions made by experts in all related areas conducted in Iberoamerica.

The success of the international meeting was paramount to the favorable outcome that you are about to read. Originally RIAO-OPTILAS-MOPM 2019 published a total of 393 papers (138 from students and 255 from researchers) through a review process; out of these articles, 32 were selected as invited. Participants came from 31 countries including Argentina (14), Austria (1), Bolivia (1), Brazil (4), Canada (6), Chile (3), China (1), Colombia (63), Cuba (1), El Salvador (1), España (21), Francia (7), Germany (2), Ireland (1), Israel (1), Italy (3), Japan (4), México (221), Netherlands (4), Norwegian (1), Perú (2), Poland (1), Portugal (2), Romania (2), Russia (1), Sweden (1), Switzerland (4), United Kindom (2), United States (14), Uruguay (3), and Venezuela (1).

Applied Optics (AO) received 59 papers, and after the strict review process involving at least two reviewers, we gathered 36 papers on 14 different topics. The submission deadline was November 15, 2019, with the accepted papers published only five months later (May 1, 2020). Most were available online within two to three months after submission. Some manuscripts, subject to demanding reviewer observations, are still in the revision or production processes but are expected to be published within the next few months. The 36 Optics Theory and Practice in Iberoamerica (OTPI) papers included in this feature issue of AO represent a vast range of exciting and new research of our disciplines, not only in Latin America but also the rest of the world. Next, you will find a brief survey of the articles contained within the feature issue organized by topic.

The topic of atmospheric and oceanic optics includes one article [1]. Here the authors deal with the retrieval of UV-absorbing trace gases present in the atmosphere. They combine multiaxis differential optical absorption spectroscopy (DOAS) to perform a tomographic reconstruction of the distribution of gases emitted from different sources. A new algorithm introduced an adaptive approach with locally tuned regularization weight and applied it to experimental data.

The topic of fiber optics, fiber sensors, and optical communications also includes one article [2]. The authors present the development of a biosensor based on optical fiber, using a polyclonal antibody kisspeptin receptor as a biological recognition element to help suppress metastasis in melanoma breast cancer. Structural homogeneity of the biosensor, at each stage of the self-assembly, was characterized by Fourier transform infrared spectroscopy and by measurements of the transmission at the biosensor output.

With four contributions in Fourier optics and optical processing, this is a hot topic in the feature issue. Ref. [3] presents a new methodology called radial Hilbert transform optimized (RHTO) for longer correlation signatures. An analysis with eight non-homogeneous patterns was performed with 2000 letter variants and 30 phytoplankton species with outstanding results. In Ref. [4], the authors present a noniterative simultaneous phase unwrapping and denoising algorithm based on least squares discrete cosine transform (DCT) and additional sparsity constraint on the DCT coefficients. The computational complexity of the proposed method is sufficiently slow, with results being several orders of magnitude faster on experimental data from synthetic aperture data showing the capability for processing real images. Ref. [5] presents a smart brute-force double random-phase encoding attack that takes advantage of an unreported vulnerability: the smoothness of mean squared error (MSE) and correlation coefficient (CC) curves in a key-sensitive analysis. Knowledge of such vulnerability and how to prevent it provides a better understanding of the robustness of various double random-phase encoding designs. Finally, [6] presents an optodigital protocol for the compression of 3D dynamic scenes recorded with an off-axis Fresnel holographic system. The authors achieved a volume reduction of up to 93.71% and a 16-fold decrease in transfer time. Results showed a high level of lossy compression with better reconstruction quality than the MPEG-4 video compression technique.

The topic of holography includes one article, [7]. Here, the authors propose an algorithm that reduces the number of pixels needed for an object's wave field trimming, cutting notably its processing time without significant changes in the quality of the reconstructed image. Their method generates an extraction window containing a complete object's wave field. This method reduces the number of operations and execution time for holographic reconstruction significantly.

The following topic of imaging systems, image processing, and displays includes four works. Ref. [8] analyzes the use of two varifocal lenses, with fixed interlens separation, for achieving tunable magnification at a specific throw. The proposed methodology extends the Hopkins procedure circumscribed to the determination of fixed optical powers in a multilens system. They illustrate the results by presenting the Gaussian optics design of surgical spectacles while generating virtual images with zero throws. Ref. [9] recalls one of the most critical problems for the area of computer vision, the automatic localization of a single camera. In this paper, the authors show how to compute the localization of a camera through an uncalibrated approach making use of projective properties and some reference points. They introduce a simple yet powerful approach to detect coded targets in images. The experiments carried out confirmed the validity and accuracy of the proposal. In Ref. [10], the authors applied brain programming, a machine learning methodology, to the categorization problem of art media. In this study, the authors make a comparison with deep learning to understand the limits and benefits of the proposed approach. They train and validate results with the Kaggle database and test the best results with the WikiArt database. The results confirm that brain programming designed programs match or surpass deep learning in three out of five classes (over 90%) while being close to AlexNet (less than 5%) in the remaining two categories with significantly simpler programs. Finally, [11] presents an expert knowledge technique based on image processing, evolutionary algorithms, and machine learning to recognize leukemic cells. Convolutional neural networks are used as a benchmark to compare the proposed technique with a standard dataset of 260 healthy and leukemic cell images. Results show the superiority of traditional pattern recognition since it scores 99.63% in accuracy while meeting the requirement of being explainable.

The topic of instrumentation and measurements includes eight papers making it the hottest topic of OTPI 2020. Ref. [12] proposed a noninvasive and nondestructive method for obtaining the setting time for cement paste. The technique consists of the Kubelka–Munk model to calculate the dynamic behavior of the cement paste from the diffuse reflection properties of both cement components and hydration products according to the Powers–Brauner model. As a result, the method allows them to obtain the initial and final cement setting times. Ref. [13] proposes an efficient deterministic approach to generate dithering patterns using the composition of two-dimensional patches as a stack of one-dimensional arrays. This procedure is a one-dimension optimization problem in the intensity domain, employing only a quarter of the fringe pitch. The results confirm the effectiveness of the proposal in numerical simulations and experimental results. In Ref. [14], the authors report the application of cyclic voltammetry and absorption spectroscopy to the characterization and study of the stability of silver colloids in water. Cyclic voltammetry shows a pattern reduction peak whose position is specific to each analyzed sample. Optical analysis of a colloid precursor shows that nanoparticles change in size and surface state to attain a stable colloidal form. Sunlight exposure produces the most significant surface plasmon resonance (SPR) intensity drop, but the electrochemical technique shows itself promising as well. Ref. [15] reports a vibration-insensitive, single-shot phase-calibration method for phase-only spatial light modulators (SLMs). The technique uses a geometric phase lens to form a phase-shifting radial shearing interferometer to enable common-path measurements. The methodology is robust against intensity errors due to misalignment offering high environmental stability. The experimental results confirm the high accuracy in comparison with diffraction-based approaches. In Ref. [16], the authors present optical and mechanical characterization of an inhomogeneous biopolymer sample. Characterization consists of speckle patterns for 1360 states and the computation of displacement maps and their corresponding strain maps. Since map information changes with size due to the sampling being pulled at the upper end while clamped at the lower end, scaling is required, and authors present a method to solve the problem. The experimental results show the success of the novel proposal to characterize inhomogeneous materials. Ref. [17] proposes a hybrid calibration that leverages stereo-vision (SV) calibration approaches using a phase-coordinate mapping (PCM) method to achieve higher accuracy. The method provides a balance between the flexibility of SV methods while being robust to lens distortion. It also has a simple relation between the recovered phase and the metric coordinates. Experimental results show that the proposed hybrid method outperforms the SV method in terms of accuracy and reconstruction time due to its low computational complexity. Ref. [18] deals with the visualization

and analysis of interaction of a cutting wedge disintegrator with plastic at low loads. Authors propose a contactless optical holographic interferometry, thus allowing a comprehensive picture of the stress state when opening microcracks. An experimental model was designed considering that the geometric parameters had to comply with the applied method. Final results allow them to record even the initial stages of the crack while observing stress fields on the cutting wedge as well as on the loaded body in the form of interference fringes. In Ref. [19], the authors present a microscope vision system to characterize a microscale surface via microlaser line projection. They performed the characterization using surface descriptors computed with the gray-level co-occurrence matrix. The characterization is carried out by an optical microscope, a CCD camera, and a 36 μm laser. The experimental results corroborated this contribution by characterizing metal and paper surfaces.

The topic of integrated optics includes one paper [20]. In this work, the authors discuss evanescent-light coupling to silicon waveguides using surface plasmon polaritons (SPPs) in the Otto configuration. The setup consists of a fused-silica prism, a 100nm silver layer with a 65nm airgap between them, and a tapered silicon waveguide. A two-dimensional lumerical finite-difference time-domain (FDTD) simulation shows a coupling efficiency of 54%. The fabricated device on a silicon-on-insulator substrate shows a 10% light transmission for *p*-polarized light.

The topic of materials includes three papers. Ref. [21] presents a study about reflectance anisotropy spectroscopy (RAS) divided into two parts: first, nonequilibrium RAS spectra acquired in real-time during the homoepitaxial growth of GaAs; second, RAS spectra for GaAs surfaces under equilibrium with several arsenic overpressures. Authors show that in both cases, RAS spectra can be decomposed into two basic components, each with a characteristic line shape. The results provided should be useful for the interpretation of the physics underlying the rapid time evolution of dynamic RAS spectra during the first monolayer growth. In Ref. [22], the authors present a study about solar cells to achieve high-power conversion using mixed-halide organic–inorganic hybrid perovskites, a kind of light-absorbing material. This consists of a nonradiative recombination pathway as an energy-conversion mechanism. In this work, a combination of optical and photoacoustic spectroscopies is used to determine the visible spectra light-into-heat conversion efficiency of lead-based mixed-halide organic–inorganic hybrid perovskites in a semicomplete $n-i-p$ mesoscopic perovskite solar cell (PSC). A remarkable average conversion efficiency of about 87% has been found for the nonradiative combination. Ref. [23] presents a study about aluminate spinel-type MAl_2O_4 (M = Ba, Mg) materials prepared by a combustion synthesis annealed either in an air or a carbon atmosphere. They characterized materials using XRD, SEM, DRS, EIS, and PL measurements and their photocatalytic activity evaluated for the dye degradation and hydrogen evolution. The results suggest that air annealed photocatalysts are suitable for oxidation-dependent reactions, while carbon annealing may enhance reduction-dependent reactions.

The topic of medical optics, microscopy, and biotechnology includes three papers. In Ref. [24], the authors describe a new class of diffraction-based corneal inlays for the treatment of presbyopia. The goal of the inlay is to achieve an improvement of the near focus quality over previous designs. Their design includes a two-zone hybrid device with a separated amplitude and phase areas having a central aperture and no refractive power. They applied ray-tracing software to study the performance of the proposal using the Liou–Brennan model eye. The results show excellent performance by improving the quality of the near vision. Ref. [25] presents a study about light-sheet fluorescence microscopy consisting of a robust and compact version that is easy to assemble and requires little to no maintenance. An essential aspect of the design is that the illumination unit consists of reflective elements, thereby reducing chromatic aberrations an order of magnitude as compared to refractive counterparts. It is expected that the new design helps the ongoing revolution in developmental biology. Ref. [26] describes attenuation properties from different *ex vivo* rat tissues using an optical fiber-based supercontinuum setup and a custom-made spectrophotometer. The method can differentiate between scattering and absorption coefficients in biological tissues (heart, brain, spleen, retina, and kidney). Theoretical assumptions combined with experimental measurements demonstrate that, in this infrared range, tissue attenuation and absorption can be accurately measured.

The topic of nonlinear optics also includes two papers. Ref. [27] reports the optical response exhibited by a complex hybrid system integrated by Pt ultrasmall fluorescent particles and plasmonic Ag nanoparticles. The system was synthesized by coimplantation of Ag and Pt ions into a silica matrix followed by proper thermal annealing. Optical absorption and emission spectroscopies show that the complex nanostructures exhibit an important plasmonic response. The study concludes that the inhibition of the two-photon absorption effect and enhancement in the emission of the complex hybrid samples by the synergic participation of Ag and Pt particles can be explained as a result of a plasmon coupling via the near-field interaction between plasmonic and emitting sources. In Ref. [28], authors review recent contributions about the operation of random lasers (RLs)—lasers without conventional cavities—due to the interplay between gain and scattering of light propagating in disordered media. The review includes the demonstration of self-second-harmonic and self-sum-frequency generation, the characterization of Lévy's statistics of the output intensity fluctuations, and replica symmetry breaking by RLs based on nanocrystals containing trivalent neodymium ions.

The topic of optical design and fabrication consists of one paper [29]. In this work, the authors solve the radiative heat transfer problem in one dimension to perform a comparative analysis of the time-averaged performance of the partially transparent radiative windows and radiative coolers. The main question is about the maximal visible light transmission through the window at which the temperature on the window somber side does not exceed that of the atmosphere. Authors demonstrate that transmission of the visible light through smart windows can be significantly increased without additional heating of the windows.

The topic of optical devices, sensors, and detectors includes two papers. In Ref. [30], the authors present a nonlinear model of an atomic force microscope considering Lennard-Jones potential and the nonlinear friction produced by the squeeze

film damping effect between the cantilever and the sample. They applied the Melnikov method to establish the condition for the persistence of the homocline orbit when the model has nonlinear friction. They present an analytical and numerical approach to verify the solutions of the model. Ref. [31] offers a novel system suitable for simultaneous monitoring of both oil-in-water and suspended solids based on thermal lens spectroscopy and forward light scattering. The technique measures the concentration of dissolved hydrocarbons and simultaneously detects single oil droplets and suspended particles separately. They test particle detection with model samples of dyed and undyed polystyrene spheres acting as absorption and scattering centers. They conclude that particles of different sizes are distinguished by the magnitude of the perturbations introduced in the signals, and their concentrations can be measured independently of dissolved components.

The topic of physical optics includes three papers. Ref. [32] deals with nonparaxial modeling of optical field propagation at distances comparable to the wavelength and under arbitrary spatial coherence, which is crucial for micro- and nanoparticles. Contrary to Fourier and Fresnel transform-based algorithms, a nonparaxial matrix algorithm is capable of simulating the 3D optical field distribution in the volume delimited by the input and the output planes at a very short distance. Simulations of specific experimental situations, including speckle phenomena, illustrate the algorithm's capabilities. In Ref. [33], the authors introduce the higher-order Bessel functions with a vortex azimuthal factor to propose a family of functions to generalize the function defining the Airy pattern. These functions, called vortex jinc functions, happen to form an orthogonal set. They use this property as a way of fitting various surfaces in a circular domain, with applications in precision optical manufacturing, wavefront optics, and visual optics. Ref. [34] develops simple models for the optical reflectivity of an interface in optical contact with random media consisting of discrete volumes of arbitrary form and different refractive indices. They study the case of internal reflectivity, in which the incidence medium has a more extensive refractive index than the refractive indices at the other side of the interface. They compare predictions of the surface coherent-reflectance model with numerical simulations. Then, they use the surface's reflectance models to interpret experimental measurements obtained with an optical prism, and a thin vegetable tissue adhered to its base. They conclude that the surface reflectivity can be used to determine the fractional contact area between the interface and microdroplets or biological cells and infer their refractive indices with an accuracy of about 0.5%.

The last topic is terahertz and x-ray optics, and it includes one paper [35]. Here, the authors study the use of three effective medium theory models, namely Maxwell–Garnett, Bruggeman, and Landau–Lifshitz–Looyenga, for the dielectric response of biological tissue in the terahertz band of the electromagnetic spectrum. They performed measurements on water-dehydrated basil binary mixtures encompassing the entire concentration range, and they further analyze the dielectric function with the models. Their results indicate that the Landau–Lifshitz–Looyenga and Bruggeman models provide a marginally better fit to the experimentally measured dielectric function in the terahertz band. In conclusion, they discuss the biological relevance of the models based on their fundamental assumptions.

The members of the RIAO-OPTILAS-MOPM community, scientists, and engineers publishing in the theory and applications of optics, lasers, and photonics conducted in Iberoamerica, and the editors who had the privilege of assembling this collection of papers, would like to express our gratitude to Dr. Ronald Driggers, the Editor-in-Chief of AO for approving us to compile the documents featured in this special issue, OTPI 2020.

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REFERENCES

1. N. Casaballe, M. D. Martino, M. Osorio, J. A. Ferrari, T. Wagner, and E. Frins, "Improved algorithm with adaptive regularization for tomographic reconstruction of gas distributions using DOAS measurements," Appl. Opt. **59**, D179–D188 (2020).
2. K. González-León, G. Beltrán-Pérez, S. Muñoz-Aguirre, V. L. Gayou, J. Castillo-Mixcoatl, V. Alatriste, and R. Delgado-Macuil, "Experimental characterization of a biosensor based on a tapered optical fiber for kisspeptin detection," Appl. Opt. **59**, D131–D137 (2020).
3. A. Castro-Valdez, J. Álvarez Borrego, and S. Solorza-Calderón, "Image correlation by one-dimensional signatures invariant to rotation, position, and scale using the radial Hilbert transform optimized," Appl. Opt. **59**, D12–D20 (2020).
4. J. Pineda, J. Bacca, J. Meza, L. A. Romero, H. Arguello, and A. G. Marrugo, "SPUD: simultaneous phase unwrapping and denoising algorithm for phase imaging," Appl. Opt. **59**, D81–D88 (2020).
5. A. H. Ramirez-Andrade, R. Porras-Aguilar, and K. Falaggis, "Optical encryption based on double random-phase encoding: secure versus unsecure variants," Appl. Opt. **59**, D118–D124 (2020).
6. S. Trejos, M. Gómez, A. Velez-Zea, J. F. Barrera-Ramírez, and R. Torroba, "Compression of 3D dynamic holographic scenes in the Fresnel domain," Appl. Opt. **59**, D230–D238 (2020).
7. N. Leal-León, M. Medina-Melendrez, J. M. Flores-Moreno, and J. Álvarez Lares, "Object wave field extraction in off-axis holography by clipping its frequency components," Appl. Opt. **59**, D43–D53 (2020).
8. C. M. Gómez-Sarabia and J. Ojeda-Castañeda, "Hopkins procedure for tunable magnification: surgical spectacles," Appl. Opt. **59**, D59–D63 (2020).
9. M. Chan-Ley, G. Olague, G. E. Altamirano-Gomez, and E. Clemente, "Self-localization of an uncalibrated camera through invariant properties and coded target location," Appl. Opt. **59**, D239–D245 (2020).
10. M. Chan-Ley and G. Olague, "Categorization of digitized artworks by media with brain programming," Appl. Opt. **59** (2020).
11. R. Ochoa-Montiel, G. Olague, and H. Sossa, "Expert knowledge for the recognition of leukemic cells," Appl. Opt. **59** (2020).
12. J. J. Soto-Bernal, G. V. Vázquez, R. González-Mota, I. Rosales-Candelas, J. A. Ortiz-Lozano, and H. A. De-León-Martínez, "Optical

method to characterize and assess setting evolution of cement pastes," Appl. Opt. **59**, D1–D5 (2020).
13. A. Silva, A. Muñoz, J. L. Flores, and J. Villa, "Exhaustive dithering algorithm for 3D shape reconstruction by fringe projection profilometry," Appl. Opt. **59**, D31–D38 (2020).
14. M. Navarrete, R. Mayen-Mondragon, R. Sato, E. V. Mejía, D. Aguirre-Aguirre, and J. Genesca, "Stability analysis of silver nanoparticle suspensions by cyclic voltammetry," Appl. Opt. **59**, D104–D110 (2020).
15. L. A. DeMars, M. Mikuła-Zdańkowska, K. Falaggis, and R. Porras-Aguilar, "Single-shot phase calibration of a spatial light modulator using geometric phase interferometry," Appl. Opt. **59**, D125–D130 (2020).
16. G. A. Gómez-Méndez, A. Martínez-García, J. A. Rayas, and A. Gaitán, "Application of speckle interferometry to the mechanical characterization of a biopolymer sample," Appl. Opt. **59**, D148–D154 (2020).
17. R. Vargas, A. G. Marrugo, S. Zhang, and L. A. Romero, "Hybrid calibration procedure for fringe projection profilometry based on stereo vision and polynomial fitting," Appl. Opt. **59**, D163–D169 (2020).
18. P. Frankovský, Z. Brodnianská, J. Bocko, M. Trebuňová, J. Kostka, M. Kicko, and P. Čarák, "Application of holographic interferometry in the analysis of stress states in a crack root area," Appl. Opt. **59**, D170–D178 (2020).
19. F. C. M. Alanís and J. A. M. Rodriguez, "Microscope vision system based on micro laser line scanning for characterizing microscale topography," Appl. Opt. **59**, D189–D200 (2020).
20. J. R. Kim and A. Siahmakoun, "Evanescent coupling to silicon waveguides using surface plasmon polaritons," Appl. Opt. **59**, D64–D68 (2020).
21. A. Lastras-Martínez, L. E. Guevara-Macías, J. G. Santiago-García, J. Ortega-Gallegos, I. A. Ruiz-Alvarado, R. Martínez-Espinosa, D. Ariza-Flores, R. Castro-García, R. E. López-Estopier, R. E. Balderas-Navarro, and L. F. Lastras-Martínez, "Real-time reflectance anisotropy spectroscopy of GaAs homoepitaxy," Appl. Opt. **59**, D39–D42 (2020).
22. J. A. Ramirez-Rincon, A. M. Castro-Chong, I. Y. Forero-Sandoval, C. L. Gomez-Heredia, D. Peralta-Dominguez, M. G. Fernandez-Olaya, J. J. Becerril-González, G. Oskam, and J. J. Alvarado-Gil, "Determination of the nonradiative conversion efficiency of lead mixed-halide perovskites using optical and photothermal spectroscopy," Appl. Opt. **59**, D201–D209 (2020).
23. T. Mumanga, L. Diaz-Torres, E. Montes, and C. Gómez-Sols, "MaI_2O4 (M = Ba, Mg) photocatalytic activity dependence on annealing atmosphere," Appl. Opt. **59**, D246–D252 (2020).
24. D. Montagud-Martínez, V. Ferrando, J. A. Monsoriu, and W. D. Furlan, "Proposal of a new diffractive corneal inlay to improve near vision in a presbyopic eye," Appl. Opt. **59**, D54–D58 (2020).
25. B. Moretti, N. P. Müller, M. Wappner, and H. E. Grecco, "Compact and reflective light-sheet microscopy for long-term imaging of living embryos," Appl. Opt. **59**, D89–D94 (2020).
26. A. Sanchez-Cano, J. E. Saldaña-Díaz, L. Perdices, I. Pinilla, F. J. Salgado-Remacha, and S. Jarabo, "Measurement method of optical properties of *ex vivo* biological tissues of rats in the near-infrared range," Appl. Opt. **59**, D111–D117 (2020).
27. J. Bornacelli, C. Torres-Torres, B. Can-Uc, R. Rangel-Rojo, and A. Oliver, "Plasmon coupling interactions and inhibition of nonlinear absorption in a complex system with Ag and Pt nanoparticles in silica," Appl. Opt. **59**, D69–D75 (2020).
28. A. L. Moura, S. J. Carreño, P. I. R. Pincheira, L. J. Q. Maia, V. Jerez, E. P. Raposo, A. S. L. Gomes, and C. B. de Araújo, "Nonlinear effects and photonic phase transitions in Nd^{3+}-doped nanocrystal-based random lasers," Appl. Opt. **59**, D155–D162 (2020).
29. E. Zhang, Y. Cao, C. Caloz, and M. Skorobogatiy, "Improving thermo-optic properties of smart windows via coupling to radiative coolers," Appl. Opt. **59**, D210–D220 (2020).
30. J. S. Duque, A. Gutierrez, and D. Cortés, "Dynamics of a micro-electro-mechanical system associated with an atomic force microscope considering squeeze film damping," Appl. Opt. **59**, D76–D80 (2020).
31. A. M. Lacapmesure, O. E. Martínez, and D. Kunik, "Device for real-time monitoring of oil-in-water and suspended solids based on thermal lens spectrometry and light scattering," Appl. Opt. **59**, D138–D147 (2020).
32. R. Castañeda, J. Laverde, and J. Moreno, "Matrix algorithm for 3D nonparaxial optical field modeling under arbitrary spatial coherence," Appl. Opt. **59**, D21–D30 (2020).
33. J. E. Gómez-Correa, M. A. Platas-Garza, J. P. Trevino, A. Jaimes-Nájera, A. L. Padilla-Ortiz, A. Galaviz-Mosqueda, V. Coello, J. Rogel-Salazar, and S. Chávez-Cerda, "Topographic synthesis of arbitrary surfaces with vortex Jinc functions," Appl. Opt. **59**, D95–D103 (2020).
34. A. Acevedo-Barrera, O. Vázquez-Estrada, and A. García-Valenzuela, "Optical reflectivity of an interface with random refractive-index-contrast patterns," Appl. Opt. **59**, D221–D229 (2020).
35. G. G. Hernandez-Cardoso, A. K. Singh, and E. Castro-Camus, "Empirical comparison between effective medium theory models for the dielectric response of biological tissue at terahertz frequencies," Appl. Opt. **59**, D6–D11 (2020).