The Influence of Feed Probes on the Modes of Circular Sector Microstrip Antennas: An investigation

Publisher: IEEE

Sudip Kumar Ghosh ; Abhijyoti Ghosh ; Subhdradeep Chakraborty ; Lourembam Lolit Kumar Singh ; Sudipta Chattopadhyay All Authors

Abstract:
In this article, the key influence of the feed-probe position for the excitation of desired modes in a circular sector microstrip antenna (CSMA) is thoroughly investigated via physical analysis comprising simulations and measurements. The approximate feed location used to excite a particular mode is also empirically determined to facilitate further exploration of CSMAs. Based on the proposed analysis and simulations, CSMAs with a wide range of sector angles are studied, and good agreements are revealed when compare with the measurements.

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Influence of Additive White Gaussian Noise on the OEO Output

Publisher: IEEE | Cite This | PDF

Arindum Mukherjee ; Shantanu Mandal ; Dia Ghosh ; B. N. Biswas All Authors

Impact Statement:
We report on the output parameters of a single loop OEO under the influence of AWGN. It is significant because this OEO, when used in PLL for capturing signals from a spacecraft in deep space missions, would receive signals which are buried under AWGN. This work investigates the parameters by which the output to input carrier-to-noise ratio can be improved. The frequency response characteristics and the stability zones of the proposed system have been discussed in detail. The paper should be of interest to readers in the areas of optical communication, microwave photonics and Radio-over-Fiber systems employing OEO as it is considered to be one of the most significant components of recent microwave photonics systems for generating ultra-pure and long-term stable microwave signals.

Abstract:
This paper audits the output carrier-to-noise ratio of a single-loop OEO when the incoming signal is contaminated with additive white Gaussian noise. Investigations have been carried out for the possibility of increasing the output carrier-to-noise ratio. A detailed analysis of the hysteresis or `jump phenomenon' of the single-loop OEO has been reported by utilizing the Lyapunov stability criterion. The total output distortion power has been derived assuming Carson's rule for bandwidth to hold, at the input port of the OEO. It has been observed that the injection synchronized OEO acts as an amplifier when the incoming FM signal is contaminated with noise.

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Design Approach Toward Compact Circular Sector Microstrip Antenna With Low Cross Polarization

Publisher: IEEE

Sudip K. Ghosh ; Abhijyoti Ghosh ; Subhradeep Chakraborty ; L. Lolit K. Singh ; Sudipta Chattopadhyay All Authors

Abstract:
In this letter, a novel and compact 180° circular sector microstrip antenna has been proposed. The patch surface has been designed with a proper design insight to perturb and control the orthogonal surface current paths and orthogonal field components at the truncated edges for suppression of cross-polar (XP) radiations over the whole elevation without hampering its radiation pattern and bandwidth. The proposed antenna gives consistently better performance with different (large, medium, and small) ground plane sizes in spite of massive miniaturization (of 82%) with reference to conventional circular microstrip antenna at the same frequency. The proposed antenna can also be circumscribed completely within a sphere of radius (λ/2π), i.e., wheeler limit and hence can stand well as a small antenna.

Published in: IEEE Antennas and Wireless Propagation Letters (Volume: 20 , Issue: 3, March 2021)

International Journal of Computational Vision and Robotics > 2021 Vol.11 No.3

Title: Human skin ringworm detection using wavelet and curvelet transforms: a comparative study

Authors: Manas Saha; Mrinal Kanti Naskar; B.N. Chatterji

Addresses: Electronics and Communication Engineering Department, Siliguri Institute of Technology, Sukna-734009, West Bengal, India ' Electronics and Telecommunication Engineering Department, Jadavpur University, Kolkata-700032, India ' Department of Computer Science and Engineering, B.P. Poddar Institute of Management and Technology, 137, VIP Road, Kolkata-700052, India

Abstract: The common human skin disease called ringworm is investigated in the light of computer vision. Two distinct methodologies are developed for its detection. The first methodology implements three-level multi-wavelet decomposition of the skin images and subsequent evaluation of the approximation and detail subband energies which act as the texture characterising features. The second methodology incorporates the curvelet to segment the circular protrusion of the skin images especially with ringworms followed by statistical texture investigation by grey-level co-occurrence matrix (GLCM). After feature extraction by both the methodologies, binary classifier called the support vector machine (SVM) recognises the images as ringworm with detection accuracy of around 87% and 80% for the first and second methodologies respectively. In addition, the performance indexing parameters of SVM classification like sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) which are not previously addressed are evaluated. Both the methodologies are comprehensively demonstrated and compared to select the better one. The selected method is then compared with the available technique and commented upon.

Keywords: multiresolution; wavelet; curvelet; approximation subband; detail subband; energy signature.

DOI: 10.1504/IJCVR.2021.115158

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Research Article

Experimental Verification of a New Oscillation-based Test Algorithm for Analog Circuits

M. Parai, S. Srimani, K. Ghosh & H. Rahaman

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Download citation | https://doi.org/10.1080/03772063.2021.1994040 | Check for updates

Abstract

Oscillation-based test algorithm has been proposed and verified experimentally as an alternative to the specification--based test of analog circuits. Active filters are transformed to oscillators using nonlinear feedback, realized with a Schmitt trigger. Faults are detected based on the deviation of the oscillation frequency outside the tolerance band due to the variation of different circuit components under test. This proposed technique ensures high test precision due to the processing of the oscillation frequency with the help of a purely digital circuit. Undetectable ranges of parametric faults of circuit components have been identified by simulation with Cadence virtuoso using the 0.18 μm CMOS technology. Then, practical circuits of second order Butterworth Low Pass Filter and Sallen-Key Band Pass Filter have been tested experimentally. Experimental results ensure high fault coverage of the proposed test strategy.

INTERNATIONAL TRANSACTIONS ON
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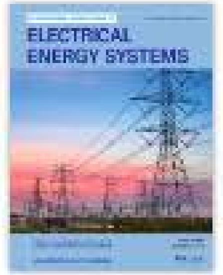

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RESEARCH ARTICLE

Coordinated AC frequency vs DC voltage control in a photovoltaic-wind-battery-based hybrid AC/DC microgrid

Asim Datta, Alejandro C. Atoche, Indrajit Koley, Rishiraj Sarker, Javier V. Castillo, Kamalika Datta, Debasree Saha

First published: 16 August 2021 | https://doi.org/10.1002/2050-7038.13041 | Citations: 1

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Summary

The intermittent nature of renewable energy generation and the variable AC and DC loads are major factors that offer great challenges in power management for AC/DC hybrid microgrids. In this context, this paper presents a coordinated AC frequency vs DC voltage control (CFVC) scheme for managing contemporary renewable energy-based hybrid AC/DC microgrids. The proposed control strategy enables appropriate power interactions between the AC and DC subgrids while sharing power fluctuations in a coordinated way. Both the AC and DC subgrids support each other in accordance with their normalized relative changes in AC frequency and DC voltage, respectively. The proposed CFVC scheme is designed using fractional-order-proportional-integral-derivative (FOPID) controllers, and bacterial-foraging optimization (BFO) method is employed for calculating the design parameters, viz. the controller gains and set-point orders. A typical photovoltaic (PV) wind-battery-based hybrid AC/DC microgrid is modelled and investigated, and the usefulness of the proposed scheme is validated under the renewable energy variations and load perturbations.

LOAD FREQUENCY CONTROL SCHEME FOR A MICROGRID SYSTEM WITH THE APPLICATION OF hTLO-DE ALGORITHM

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Abstract:

Load frequency control (LFC) is a crucial feature of electric power systems to maintain a balance between power supply and load demand, thus avoiding a deviation of the grid frequency. The present work aims to implement an effective LFC scheme for a microgrid system consisting of a diesel generator (DEG), a wind turbine generator (WTG) and a battery storage system. Proportional-integral-double-derivative (PIDD) controllers are used to implement the proposed LFC scheme. The controller parameters are computed using an innovative hybrid teaching-learning-optimization differential-evaluation (hTLO-DE) algorithm. The main scope of the work lies in application of hTLO-DE optimized PIDD controllers in DEG-WTG-battery storage based MG system. The results obtained with PIDD controllers are compared with those obtained with the traditional PI and PID controllers. A critical analysis shows that the PIDD controller can provide better dynamic responses in terms of settling time and magnitude of oscillations compared to PI and PID controllers. The frequency responses of the system are studied under different scenarios of generation and load variations, which establishes the robustness of the proposed PIDD-based LFC scheme.

1 Introduction

Microgrid is defined as the arrangement of a local electric power network using regulated loads and distributed energy resources (DERs) like wind turbine generators (WTG), diesel generators (DEG), battery storage, and so on [1]. Considering the current fossil fuel crisis and environmental problems, renewable energy sources (RESs) are gaining importance. Conversely, the conventional fossil fuel based generation is always reliable as does not depend on weather conditions. The idea of mixing renewable and conventional energy generations relies on the equilibrium among the reliability in generation, cost of generation, and environmental issues [2]. But in connection with the renewable energy-based distributed generations (DGs), there are many challenges like controllability, islanding operation, stability of the system, etc. [3]. The grid controls the voltage and frequency at the DG interconnection points in grid-connected mode. Nonetheless, the fundamental problem in operating a renewable energy-based DG in islanded mode is its stability. In non-islanded mode, the power storage system in a microgrid can support the power balance [4], but a competent LFC method is needed to maintain the system frequency [5].

The goal of LFC is to minimize the frequency deviation by regulating the power flow of DERs in the system. Therefore, system frequency and tie-line power flows are monitored and generation within the region is adjusted to keep the time average of the area control error (ACE) constant. In LFC, ACE is commonly used as a measure of regulation. To achieve a lower ACE, both the tie-line power and frequency errors should be

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Article

Static Permittivity and Electro-Optical Properties of Bi-Component Orthoconic Antiferroelectric Liquid Crystalline Mixtures Targeted for Polymer Stabilized Sensing Systems

Shantiram Nepal [1], Banani Das [1,*], Malay Kumar Das [2], Madhumita Das Sarkar [3], Magdalena Urbańska [4] and Michał Czerwiński [4,*]

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Abstract: The behavior of two newly formulated bi-component orthoconic antiferroelectric liquid crystalline (OAFLC) systems, i.e., the Compound A + Compound B mixture system and Compound C + Compound B mixture system has been discussed in light of temperature and concentration dependencies of helical pitch length, spontaneous polarization, relaxation time, bulk viscosity, and the anchoring energy strength coefficient, together with static dielectric permittivity (ε) and dielectric anisotropy. Compound A + Compound B mixtures possess spontaneous polarization between 190–340 nC.cm^{-2} and fast relaxation times between 190–320 μs in the smectic antiferroelectric SmC$_A$* phase at room temperature. Compound C + Compound B mixtures also have a spontaneous polarization in the range of 190–280 nC.cm^{-2} and relaxation times in the range of 190–230 μs at room temperature. Most of the mixtures have a helical pitch below one micrometer in the SmC$_A$* phase. These advanced mixtures show a broad temperature range of the antiferroelectric SmC$_A$* phase, fast switching of molecules under an applied electric field, negative dielectric anisotropy and a short helical pitch, confirming the advantage of designing new polymer-stabilized OAFLC that is targeted for novel application in sensing devices, utilizing the fast responsive electro-optical modulation elements.

Keywords: antiferroelectric liquid crystals; polymer stabilization; permittivity; spontaneous polarization; response time; rotational viscosity

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Citation: Nepal, S.; Das, B.; Das, M.K.; Sarkar, M.D.; Urbańska, M.; Czerwiński, M. Static Permittivity and Electro-Optical Properties of Bi-Component Orthoconic Antiferroelectric Liquid Crystalline Mixtures Targeted for Polymer Stabilized Sensing Systems. *Polymers* **2022**, *14*, 956. https://doi.org/10.3390/polym14050956

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1. Introduction

The liquid crystalline (LC) state is an intermediate state of matter between the solid and isotropic liquid, which was discovered by an Austrian chemist, Friedrich Reinitzer, in 1888 [1]. Since then, extensive research has been performed in the field of liquid crystals. The potential area of the applicability of LC materials is very broad [2]. For the practical application of LC in electro-optic devices, it is necessary to have a reasonable response time of LC in the order of micro-seconds. Meyer et al. [3] discovered micro-second switching behavior in the ferroelectric SmC* phase of liquid crystal, i.e., the synclinic state, which was experimentally demonstrated by Clark and Lagerwall [4]. However, ferroelectric liquid crystalline materials suffer from reduced brightness due to DC compensation with only one bright state. Later, Chandani et al. [5,6] reported the existence of the antiferroelectric (AF) phase, i.e., the anticlinic state of liquid crystal, formed by chiral rod-like molecules. The chiral ferroelectric (FLC) and antiferroelectric (AFLC) materials reveal definite and very attractive properties: the electro-clinic effect is observed in the orthogonal

Physica Scripta

PAPER

Li_2O-ZnO-MoO_3-SeO_2 glass-nanocomposites and their crystalline counterparts: microstructure, electrical transport mechanism and first principle DFT analysis

Aditi Sengupta[1], Prolay Halder[2], Mir Sahidul Ali[3], Chandan Kumar Ghosh[4] and Sanjib Bhattacharya[5,2]

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DOI 10.1088/1402-4896/ac7ae9

References ▾ Open science ▾

+ Article and author information

Abstract

Li_2O doped glass-nanocomposites and their crystalline counterparts have been developed. Micro-structural study reveals the distribution of $Li_2Zn_2(MoO_4)_3$, $ZnMoO_4$, $Zn(MoO_2)_2$, $Li_2Mo_6O_7$ and Li_2MoO_3 nanorods in the glass-nanocomposites. Crystalline counterparts of them exhibit enhancement in sizes of nanophases. DFT and Density of States (DOS) spectra may be considered here to confirm the conducting nature of these nanophases. The ionic conductivity is found to be a function of frequency as well as temperature. In the small value of frequency, flat-conductivity may arise owing to the diffusional motion of Li^+ ions whereas the 'higher frequency dispersion' may cause the nature of the motion of lithium ions with a tendency of sub-diffusive random trapping. As the crystalline counterpart is formed by controlled heating, $ZnSeO_3$ chain-structure is expected to break by increasing the length and breadth of molybdate rod-like structures, which may lead to the formation of more voids (defects), where Li^+ ions are supposed to be trapped. 10%–13% of the net Li^+ ions are contributing to electrical

Research Article

Artificial Intelligent based Smart Drainage System

Debajyoti Misra, Gautam Das, Debaprasad Das

https://doi.org/10.21203/rs.3.rs-1338435/v1

Abstract

Clever monitoring and eliminating of clog in drainage is become very arduous in recent times. Presence of congestion and poorly maintained drainage system is leading various disturbances, like overflow of dirt water in streets, environmental issues and urban flooding, which in turn cause various water borne diseases and other hazards. This paper presents a smart drainage monitoring system. This advanced internet of things (IoT) based electronic system is capable of finding the blockage and removing the same using IoT. In order to do that, system consist of, a variety of sensors and clog finding modules are kept in several positions along the drainage network and the information is brought together using IoT. The ultrasonic level indicator finds whether there is any obstruction in between two successive manholes then it will activate cloud monitoring system to inform the responsible authority about the accurate location and amount of blockage. The various sensors give information about the pressure, presence of toxic gases and temperature of the particular drain. All this information is collected and analyzed by Arduino UNO microcontroller. The important

Physica D: Nonlinear Phenomena
Volume 436, August 2022, 133324

Controlling birhythmicity in a new Dual Loop Optoelectronic Oscillator with an injection locked van der Pol oscillator

Dia Ghosh [a], Arindum Mukherjee [b], Shantanu Mandal [c], Nikhil Ranjan Das [d], B.N. Biswas [e]

https://doi.org/10.1016/j.physd.2022.133324

Abstract

In the present literature, an attempt has been made to understand the birhythmic behaviour of a modified time delayed Dual Loop Optoelectronic Oscillator (DLOEO). To this end, an analytical solution of periodic oscillation is obtained using weakly nonlinear analysis. Two coexisting periodic oscillations are identified, considering shorter loop delay as a control parameter. Subsequently, to control the birhythmicity, a self-feedback mechanism is applied that incorporates the variable to be controlled and its canonical conjugate. Our study reveals that with proper control of the feedback strength, birhythmicity can be removed and monorhythmicity can be induced in the oscillator.

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Article

Static Permittivity and Electro-Optical Properties of Bi-Component Orthoconic Antiferroelectric Liquid Crystalline Mixtures Targeted for Polymer Stabilized Sensing Systems

Shantiram Nepal [1], Banani Das [1,*], Malay Kumar Das [2], Madhumita Das Sarkar [3], Magdalena Urbańska [4] and Michał Czerwiński [4,*]

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Abstract: The behavior of two newly formulated bi-component orthoconic antiferroelectric liquid crystalline (OAFLC) systems, i.e., the Compound A + Compound B mixture system and Compound C + Compound B mixture system has been discussed in light of temperature and concentration dependencies of helical pitch length, spontaneous polarization, relaxation time, bulk viscosity, and the anchoring energy strength coefficient, together with static dielectric permittivity (ε) and dielectric anisotropy. Compound A + Compound B mixtures possess spontaneous polarization between 190–340 nC.cm^{-2} and fast relaxation times between 190–320 μs in the smectic antiferroelectric SmC$_A$* phase at room temperature. Compound C + Compound B mixtures also have a spontaneous polarization in the range of 190–280 nC.cm^{-2} and relaxation times in the range of 190–230 μs at room temperature. Most of the mixtures have a helical pitch below one micrometer in the SmC$_A$* phase. These advanced mixtures show a broad temperature range of the antiferroelectric SmC$_A$* phase, fast switching of molecules under an applied electric field, negative dielectric anisotropy and a short helical pitch, confirming the advantage of designing new polymer-stabilized OAFLC that is targeted for novel application in sensing devices, utilizing the fast responsive electro-optical modulation elements.

Keywords: antiferroelectric liquid crystals; polymer stabilization; permittivity; spontaneous polarization; response time; rotational viscosity

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