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Research papers

- ES100301 Comparison of camera based and IMU (inertial measurement unit)-based motion analysis 90-94
- S. Jang, Shi-uk Lee, J. S. Yoon, H. Bae
- Abstract:** Camera-based 3D motion analyzers are widely used to analyze body movements and gait, but they are expensive and require a large dedicated space. This study investigated whether inertial measurement unit (IMU)-based systems can replace such systems by analyzing kinematic measurement parameters. IMUs were attached to the abdomen and thigh and the shank and foot of both legs. The participant completed a 10 m-gait course 10 times and the hips, knees, and ankle joints were observed from the sagittal, frontal, and transverse planes during each gait cycle. The experiments were conducted with both a camera-based system and an IMU-based system. The measured gait analysis data were evaluated for validity and reliability using RMSE. In this regard, the differences between the RMSE values of the two systems determined through kinematic parameters ranged from a minimum of 1.39 to a maximum of 3.86. These results confirm that IMU-based systems can reliably replace camera-based systems for clinical body motion analysis and gait analysis
- ES100302 Physical and mechanical properties of polycarbonate and poly (Ethylene Terephthalate Glycol) (PC/PETG) blends 95-99
- J. Yuenyongwattanakorn
- Abstract:** Polycarbonate (PC) is one of the most widely used engineering plastic with growing applications in automotive, electronics and electrical housing due to its high impact strength and clarity. However, poor chemical resistance and process-ability limit its applications. This work produced new generics of PC and polyethylene terephthalate glycol (PETG) blends using twin screw extruder, changes of process-ability was detected by melt flow index (MFI). It was found that the presence of PETG can significantly increase flowability of the blends. Transparency of the pelletized resins was also investigated visually. Mechanical properties, including, tensile properties and Izod impact strength, of the blends were found to be considerably improved by PETG introduction.

ES100303 Experimental investigation and performance evaluation of solar still with phase change material (PCM) 100-105

B. L. Patil, J. A. Hole, S. V. Wankhede

Abstract: The availability of clean, safe and fresh potable water is the major problem faced by most of the countries all over the world. Many water purification technologies like reverse osmosis, UV, electro dialysis cannot be used due to cost constraints. Solar distillation or desalination is being most economical and sustainable technology under development. Many researchers perform analysis on different designs of solar still to improve the performance of solar still over last decade This article studies stepped solar still design with pyramidal glass cover used at domestic level. The solar stills are not commercialized or standardized due to their limited yields. However with the current research and improvements they can be successfully commercialized for future domestic applications. This paper discusses the performance of stepped solar still using paraffin wax and stearic acid as a phase change material.

ES100304 Viscoelastic modelling of the degradation behaviour of PLA 106-111

A. Singh and R. M. Guedes

Abstract: Biodegradable polylactic acid (PLA) has been proposed for the use in a medical device to repair injured ligaments. PLA is aliphatic polyester that is widely used as a biomaterial because it yields non-toxic products after degradation. By using a mathematical model, this study aims to characterise the non-linear viscoelastic properties of PLA fibres during the in-vitro degradation. In the present study, Khan model is used and the model parameters were calibrated by using the uniaxial tensile test data at constant strain rate. The parameters that are used to define the behaviour were significantly affected by the various degradation stages. The predictions generated from the Khan model were found to be in an agreement with the experimental data. This model enables representing the general viscoelastic response of PLA fibres during degradation.

ES100305 BMD related torsion value evaluation of human humerus bone 112-119

S. V. Dhumne and S. N. Khan

Abstract: Human Bones are very important elements of body. A bone is a rigid and brittle organ that constitutes part of the vertebral skeleton. The skeletal system is subjected to a complex System of loading exerted by the forces of gravity and the muscles attached to the bones. Such loading modes include tensile, compressive, bending, and torsional forces applied to the bones of the skeletal system. The proposed work is aimed to investigate correlation between HU, STRENGTH & BMD of humerus bone and evolution of humerus by torsion testing setup. Model of human humerus bone sample obtained from CT- scan in the form of Hounsfield Units (HU) scale and BMD obtained from Dual-Energy X-ray Absorptiometry (DEXA) scan.

R. Pooja, A. Pragathi, S. Brindha

Abstract: The growth in wireless communication applications and the corresponding progress in the cellular network infrastructure has resulted in a budding concern on the energy consumption of the network. Energy consumed by base stations (BS) is a major part of the total energy consumption in a cellular network. In the current scenario, mobile networks form the ultimate source of communication. But it is also a great need to make this communication a green and effective one. To meet the requirement the power consumption criterion for a cellular base station have considered and analyzed. The proposed work is aimed at identifying a suitable BS infrastructure to meet the requirement in an energy efficient way. Power consumption comparison of Macro and micro BS is carried out by varying the transmission power for different distance coverage using MATLAB simulation. The simulation results confirm that Micro BS infrastructure provides an energy efficient and cost effective solution.