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P-137 Edge-cracked bimaterial systems under thermal heating

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The problem of thermoelastic edge-cracking in two-layered bimaterial systems subjected to convective heating is considered. The medium is assumed to be insulated on one surface and exposed to sudden convective heating on another surface containing the edge crack. It is known that, when a bimaterial systemâ€™s surface is heated, compressive stresses arise near the heating surface, forcing the crack surfaces together over a certain cusp-shaped contact length. It is also known that, for a cooled bimaterial systems surface, tensile stresses take place close to the cooling surface and tend to open the crack. So, the edge cracked heating surface problem is treated as an embedded crack with a smooth closure condition of the crack surfaces, with the crack contact length being an additional unknown variable. Superposition and uncoupled quasi-static thermoelasticity principles are adopted to formulate the problem. By using a Fourier integral transform technique, the mixed boundary value problem is reduced to a Cauchy type singular integral equation with an unknown function as the derivative of the crack surface displacement. The numerical results of the stress intensity factors for an edge crack and a crack terminating at the interface, are calculated and presented as a function of time, crack length, heat transfer coefficient, and thickness ratio for two different bimaterial systems, namely a stainless steel layer welded on ferritic steel and a ceramic layer coating on ferritic steel

P-140 Design, Build and Test IIUM Remote Controlled Glider

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The main objective of this subject is to design and build a sailplane that meets certain performance requirement. Simple mission profile was used which is include warm up, taxi, takeoff, climb, cruise and landing. The cruising altitude, range and sailplanes requirements and specification has been decided base on certain criteria. The take off weight of the sailplane has been successfully estimated as 1.225 kg. NACA 4412 airfoil was used for the wing sectiion. The fuselage diensions were estimated. The length of the fuselage from nose to tail is 0.8 meter, and the fuselage cross section will be rectangular in shape. The power available was estimated as 0.2 hp. The static stability analysis shows good results since all three components which are wing fuselage and tail gives desirable stability results. After 13 weeks of hard work, the team had managed to complete the fabrication of sailplane and also had managed to have it flown by a hired RC pilot. The aircraft flew without any difficulty and the objectives was reached, which is to perform an unpowered gliding.

P-142 Lightweight Biodegradable Cotton/Albumen Board (CAB) for Sustainable Environment

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The depletion of petroleum resources coupled with environmental awareness have spurred effort to produce biodegradable materials from natural resources, which is stable during storage and can be safely disposed after their intended time of use. These materials also can form the basis for sustainable and eco-efficient products that often results in lightweight structures having high stiffness and tailored properties for specific applications. Thereby, main objective of this work is to develop biodegradable board materials from cotton fiber reinforced egg albumen composites. The investigation is about the effect of fibre content on the mechanical properties, and thermal stability of the CAB. The composites having 0%,

3%, 6%, 10%, 13 %, and 16% w/w of cotton fibre were considered. An improvement in strength and toughness was observed with increasing fiber content, with the optimum performance was obtained for the fiber content of 10 %w/w. The results have shown that addition of the cotton fibre increased the tensile strength and impact resistance in the range of 0.7 to 10.773 MPa and 1.3 to 19.0 kJ/m^2 respectively, than that of the pristine albumen. The thermal stability of the composites was characterized by thermogravimetry analysis. The morphological study by SEM has revealed that the wettability of cotton fibre and albumen matrix was good for the fibre loading of 10 % w/w.

P-143 Lightweight Concrete for Greener Environment

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It is generally known that ordinary concrete have been occupied in construction industry because it is relatively low price and uncomplicated processing product. However, the concern is therefore lies in creation of environmental friendly with higher performance type concrete. Evidently, this is an appropriate point to consider a more efficient use of cement involving the use of natural materials as reinforcement. The efforts currently under way in producing a lightweight concrete with use of agriculture waste, coir fiber, and biopolymer, egg albumen in turn to reduce the use of Portland cement which at the same time provide concrete with better properties. The idea of this study is to investigate the physical and mechanical properties of the randomly distributed short coir fiber reinforced cement-albumen composite. Composite samples were prepared by varying the fiber content of 1-11% by weight added to the slurry of egg albumen and cement, so that the ratio of albumen and fiber-cement was 65:35 (volume percent). They were mixed homogeneously using mechanical mixer. The mixture then placed in the molds and compacted by vibration. The consolidated mass was demould after 24 hr cured. The samples finally air-dried for 7, 14, 21, 28 and 35 days. The strength (bending and compression), density (lightweight), water absorption and moisture content were determined in accordance to relevance ASTM standards. The results indicate that the addition of fiber significantly improves the post-cracking flexural stress of composite. Optimum bending strength of ≈ 8.00 MPa was achieved at 5 wt. % fiber content after cured for 35 days. Increasing in fiber content demonstrate the decreased in density with slightly increase the percentage of moisture content and water absorption. Owing to different in bonding strength, the fracture surfaces observed different hydration bond formed between fiber and matrix. These behavior correlates with the interfacial characteristics of fiber-matrix confirmed by SEM. On the basis of the results, this is a good illustration of a holistic approach towards competent exploitation of natural resources, safe disposal of waste, and new making of high quality with comparable cost concrete.

P-149 Wall Climbing Robot

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The Robot, named as TRAIN WALL BOT, is designed which has the ability to navigate on smooth vertical surfaces with the capability to avoid obstacles and overcome it if the height of the obstacles is about 1cm. The design is inspired from train steel wheel movement which uses two actuated legs with rotary motion supplied from the motor. The Robot uses pneumatic system and the suction force is supplied by an air compressor that will turn on intermittently. The sucking system force controls the attachment of the robot to the wall by using 3 vacuum valves and 6 vacuum pads (2 vacuum pads on each leg, and 2 vacuum pads below the body). The robot is controlled using PIC16F877A. The main body of the robot carries the motor and important electronic components. Two limit switches are used to acknowledge the contact with its navigating surface, one is attached with one leg and other is attested with the body part. Vacuum suction is controlled based on the ON OFF priority of the limit switch. IR distance sensor detects obstacles which are higher than 1cm. The simple design of the Robot ensures the capability to walk, climb vertically up to 85º and 90º slope smooth surfaces and avoid obstacles. It has the advantages of faster forward and backward movements which is smooth and more stable (because of the