ERU Research Dissemination Program
March 2010

Organized by the

Department of Mechanical Engineering

25th March 2010 at 11.00 am

at the

Seminar Room,
Department of Mechanical Engineering

The speakers and topics covered in this program are as follows

1. **Modeling and optimization of performance characteristics of a negative pressure wound therapy process.**
   Presented by W.P.D. Welgama

2. **Prediction of Flow Field of a Ceiling Fan by Flow Singularity Modeling**
   Presented by K.K.M.N.P. Samaraweera

3. **Design and analysis of electric vehicle chassis for local prototyping**
   Presented by M M B J B Marasingha

For more information please contact Dr. HA Gray
(Ext 4010 , hans.gray@mech.mrt.ac.lk)

Note: Abstract of the presentation is attached herewith

Abstracts

[1]
Title: Modeling and optimization of performance characteristics of a negative pressure wound therapy process.
Presenter: W.P.D. Welgama

Abstract – The healing rate of a wound can be increased by applying a controlled negative pressure externally. This treatment method is known as negative pressure wound therapy (NPWT). NPWT can be used for treating wounds which usually take a long time to heal or do not heal at all when treated using conventional treatment methods. International organizations have already developed NPWT machines, but due to their high cost, only a limited number of machines are available in Sri Lanka. A low cost NPWT machine has already been developed at the Department of Mechanical Engineering, University of Moratuwa in collaboration the Faculty of Medicine, University of Colombo. Although conceptually the device has been accepted by medical professionals further research is needed for improvement of performance for practical usage. According to the authors' knowledge no research has been done to study the performance characteristics of the NPWT system. The current study aims to model the behavior of a NPWT system and to use the existing prototype to validate the model.

[2]
Title: Prediction of Flow Field of a Ceiling Fan by Flow Singularity Modeling
Presenter: K.K.M.N.P. Samaraweera

Abstract- Although ceiling fans are used widely in Sri Lanka for improving the comfort level of buildings, the performance level of typical ceiling fan is low. Nature of the flow field of the fan depends on several parameters such as blade geometry, surface roughness, rotor velocity and fluid properties. Moreover, the existence of solid boundary in the vicinity of the fan affects for the flow field. A theoretical model which is capable of predicting flow field of ceiling fan is developed since accurate prediction of flow field is required for evaluation and optimization of fan performance. For the theoretical model two methods are followed that are free wake and prescribed wake methods. The free wake method is coupled with the lifting surface theory and modeling tool in which parameters can be varied is to be developed to illustrate the flow field. Moreover another modeling tool is to be developed by the prescribed wake method and results of these theoretical models will be compared. Moreover modeling tools are validated by laboratory tests. Subsequently, establishment of effect of important parameters such as blade geometry, surface roughness, rotor velocity, fluid properties and gap between the ceiling and rotor on the flow field is done.

[3]
Title: Design and analysis of electric vehicle chassis for local prototyping
Presenter: M M B J B Marasingha

Abstract- With the development of internal combustion engine and the cheap fuel, the interest for Electrical Vehicles (EV) was gradually diminished. However as a result of energy crisis, there is a renewed interest for EVs today. It has been forecasted that the future vehicles will be based on electric power trains which will be energized by renewable energy. For all of those vehicles the weight efficiency is vital in minimizing the fuel consumption. One of the key factors regarding the efficiency is the vehicle weight to passengers' ratio. In EV's, the main components contributing to the curb weight are chassis, body, and batteries. Although there are several chassis types used in the past, the weight distribution, component spacing and the safety aspects of an EV is differ from automobiles with internal combustion engines. This research study is focused on improving the efficiency of EVs through the development of light weight chassis suitable for local scale manufacturing and handling capabilities. This is done without forgoing essential features such as strength, comfort and safety while minimizing the designing and prototyping costs as well as time. This research study was carried out for an electric vehicle prototyping in Sri Lanka for future commercialization.