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DETERMINATION OF COLD FLOW PROPERTIES OF BIODIESEL FUEL

Biodiesel is a renewable fuel and may be a remedy to overcome the energy crisis and also global warming. The major international biodiesel standards are EN 14214 and ASTM D6751. In all specifications, the tendency of a fuel to gel or solidify at low temperatures is characterized by their Cold Flow Properties, i.e., Cloud Point, Cold Filter Plugging Point and Pour Point. They directly determine the usage of fuel according to the climatic conditions of a particular region.

The study aims to develop a new methodology for the determination of these properties which involves the determination of solid fractions in the fuel as a function of temperature during freezing. The methodology involves Computer Aided Cooling Curve Analysis technique in conjunction with Newtonian and Fourier thermal analysis.

EFFECTIVE UTILIZATION OF ENERGY SOURCES IN CYPRUS

The effective utilization of renewable and non-renewable energy resources is one of the major tasks to be achieved due to the recent energy crisis in the world. It is known that the improvements in the residential building sector can be one of the largest cost-effective potential for energy saving. The European Commission issued the Directive 2002/91/EC on energy performance of buildings aiming to promote the improvement of effective energy utilization in buildings. The Directive 2006/32/EC was issued on energy end-use efficiency and energy services which requires the establishment and achievement of national indicative targets in energy saving within a community.

The project aims to investigate the energy usage effectiveness in the residential buildings. Effectiveness in space heating applications and comparison of energy performances of dwellings in northern and southern parts of Cyprus are among the completed tasks. Investigation of cooling load of dwellings is in progress.

INVESTIGATION OF PERFORMANCES OF SOLAR DOMESTIC HOT WATER SYSTEMS IN CYPRUS

Undesirable effects and diminishing reserves of fossil fuels have led the search of alternative energy sources. Solar energy is one of the most popular renewable energy source. Cyprus is one of the world's leading countries in the usage of solar domestic hot water systems (SDHWS). The project aims to investigate the performances of thermosyphon type SDHWS during their regular usage in dwellings in the northern part of Cyprus. Observations prior to the study showed that incorrect orientation, poor insulation, poor water quality and dirty collector surfaces can be the common causes for possible low SDHWS performances. Among these, the later three are observed in almost every installation. Preliminary studies have been completed and a methodology was developed for this purpose. According to initial findings a

laboratory setup was designed and produced. Although several equipments are still missing due to economical reasons, the setup is now in the testing stage. After the verification of the developed method on-site experiments will be conducted.

ALUMINUM FOAM FILLED CRASH BOX DESIGN

The concern of safety of passengers in vehicles are on the rise in the automotive industry. One of the measures set in place to improve the safety of passengers of an automobile is to give the vehicle an optimized crash energy absorbing element in the event of a crash. This element is solely responsible to absorb the crash energy by converting this impact energy into internal energy in the form of elastic-plastic deformation. The crash absorbing element must have the ability to absorb large enough crash energy to a definite vehicle occupant safe level, therefore the use of light weight, low cost and high energy absorbing thin-walled columns filled with aluminum foam is implored.

The aim of the project is the optimization of the crashworthiness of foam-filled thin-walled structures by seeking optimal foam amount. Improving the absorbing energy of thin walled structures with different percent foam fill ratio under crash loads can be considered as the main objective.

STRUCTURAL SHAPE OPTIMIZATION USING BIOLOGICAL GROWTH METHOD

The main idea of the method biological growth is based on the observation that biological structures such as trees, bones and horns grow in such a manner that surface stress peaks are reduced. In this sense, the method shows similarities with the gradientless shape optimization and agrees with the fundamental experience that local stress peaks are the main reason for fatigue failure of structures. The method has the attractive properties that it can be very simply casted into an existing finite element solver and that it allows for an interaction of the designer during optimization. On the other hand, the application of the method is based on a heuristic approach and questions related to the optimization parameters and the optimization character have been left basically not answered.

The aim of the project is to formulate an automated design procedure which will also allow designer interaction during iterations. Changing optimization parameters during iterations manually and then automatically, remeshing of the model for better results and extending the procedure to three dimensional problems are also among the objectives of the project.