REIS
RENEWABLE ENERGY & ISLAND SUSTAINABILITY

College of ENGINEERING
UNIVERSITY OF HAWAI'I AT MĀNOA

CEE691/EE699/ME691 Seminars in Renewable Energy and Island Sustainability (REIS)

Location: Holmes Hall 247
Date: Thursday, December 8, 2016
Time: 4:30 pm-5:30 pm

Designing Sustainable Structures through Corrosion Control and Prevention of Steel and Concrete Buildings (8 minutes)

Tyler Allen

Abstract

Structural engineering involves many things including designing member sizes, configurations, and material types. However, the life span and sustainability of the structure can often be over looked. This presentation focuses on practical tips to design buildings to resist corrosion to obtain high strength, serviceability, and sustainability over the life time of the building's use. Corrosion prevention consists of selecting the proper building materials, considering the building environment, a good maintenance program, and preventing bimetallic combinations. The presentation focuses on suggestions from the American Institute of Steel Construction, the American Concrete Institute, and personnel experience.

Petroleum Remediation Feasibility Selection Tool for Tropical Island Environments (8 minutes)

Hope Mariska

Abstract

Hawaii has a long history of petroleum contamination, especially within the southern coastline of the Island of Oahu. Hawaii does not produce petroleum and has no known petroleum reserves, as such; all petroleum used on the islands is imported. Historical releases from pipelines and transfer operations have resulted in large underground petroleum contamination plumes at Honolulu Harbor and the Pearl Harbor Naval Complex. Selection tools exist for determining what remediation technologies are best applicable to certain situations, however; these selection tools are outdated and may not be applicable to projects conducted in Hawaii. My research focuses on using the Remedial Alternatives Analysis approach to evaluate various petroleum remediation technologies for use in Hawaii and marine waters. Research will include technologies for the remediation of soil and groundwater petroleum contamination as well as technologies used to clean surface water petroleum spills. The ultimate goal is to create a selection tool related to petroleum contamination in Hawaii and similar environments that can be

used by potential responsible parties and/or government officials to determine the best course of action in response to petroleum contamination.

Requirements and Costs of Residential Saferooms in Hawaii (16 minutes)

Bryce Iwami and Amy Yagi

Abstract

According to the American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures (ASCE 7), Hawaii is classified as being in a Hurricane-Prone Region. This classification is clearly justified by recalling the numerous hurricanes that nearly hit Hawaii every year. To prepare Oahu's residence for a full force hit from a Category III hurricane, Hawaii is required to fulfill stricter guidelines for wind load derivation. The Honolulu Building Code Amendments also requires safe rooms to be built in most residential homes based on certain criteria. These safe rooms will provide residents a room in their own home which will protect them from flying debris and surrounding structural collapse during a hurricane. The International Residential Building Code (IRC), an alternative code used by nonengineers to build small structures limited by strict guidelines, is also commonly used in Hawaii. The IRC is intended to satisfy basic wind-load requirements, however, from our investigation, we have found that the IRC may have made assumptions relating to the wind-load derivations that actually disqualify Hawaii from using the code.

Our project will involve the design of a few mock residential buildings using the International Building Code (IBC) (used by structural engineers) and the design of the same mock residential buildings using the IRC. The first part of our analysis will include determining whether requiring safe rooms are a practical solution to hurricane protection and what additional costs are added to a typical home by including a safe room. The second part of our analysis will be determining the differences between the IBC and IRC designed buildings and whether the IRC can still be used even though it does not assume Hawaii is in a Hurricane-Prone Region.

Autonomous Vehicle-Enabled Interoperable Arterial Management Mechanism Optimization (8 minutes)

Qiong Wu

Abstract

Traffic congestion due to rapid increase of population and traffic demand has become a serious issue which has affected the standard of living in urban settings. Among several main causes of congestion, delays at intersections with signals account for an estimated 5% to 10% of all traffic delay. One source of delay at signalized intersections is due to driver reaction-related delays. Autonomous vehicles (AVs), which partially or fully drive themselves without human intervention, have the potential to reduce the impacts of human factors on traffic delay and safety around intersections. This study concentrates on the VISSIM-based simulation platform development to enable an innovative autonomous intersection control mechanism and optimize AVs operations at intersections without signal lights. The simulation results showed that the proposed intersection mechanism can significantly improve the efficiency of intersections than traffic lights.

Traffic signal timing plans with connected vehicles (8 minutes)

Zhenning Li

Abstract

Traffic signals can enable the safe and efficient movement of vehicles through an intersection and minimize delays in a corridor. However, most signal timing plans in use must ignore or make assumptions about aspects of traffic conditions. Besides, the limited vehicle information provided by traditional point detectors at a fixed location is also a limitation to the operation of traffic signals. Thanks to the development of computer vison technology, a new initiative known as connected vehicles allows the wireless transmission of the positions, headings, and speeds of vehicles for use by the traffic controller. A new traffic control algorithm, the predictive microscopic simulation algorithm, which uses these new, more robust data, will be developed in my research.