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 1, 2016
Time: 4:30 pm-5:30 pm

Punching shear Analysis of RC two ways reinforced concrete flat Slab to column connection (16 minutes)

Wen Bo Cao & Ryan Leonardo

Abstract

The presentation will be referring to ACI318-14 code designing of punching shear slab to column connection. The set of variables will be used for analysis including lateral flexural reinforcement, bending moment, shear force, span to slab depth ratio and slab thickness. These factors are the influences on the flat two-way floor slab punching shear strength. Punching shear is a localized slab to column reinforced concrete connection failure. When structure is subjected to high lateral forced coming from seismic events, reinforced concrete slab will act like a ridged diaphragm which transfers the lateral force to the column and the column will releases the stress into the ground. The connection between the column and slab become very critical seismic event because all the forced will be concentrated in a small area. If the connection failed to transfer the loads, the pancaking effect of the structure will occur. Which the slab will drop into the bottom floor and the bottom floor slab is not designed to handle both of the impact loads and dead weight of the slab in which the whole floors will be on top of each other. Punching shear is a brittle failure mode; it has no sigh of deflection, in which it required more safety structural design.

Structural Engineering: Designing Under the Parameters of Sustainability (8 minutes)

Brandon Cezar

Abstract

Modern structural engineers face many challenges in the design and construction of projects large, small, complex, and simple. All project are never the same, yet they share an underlying concern; global environmental challenges. Much like various engineering trades, structural engineering contributes to and is directly affected by global warming. From a structural standpoint, how can structural engineers design resilient structures (buildings and bridges) under the parameters of sustainable design without sacrificing strength and robustness? From the

design to construction phase, structural engineers must consider environmental, economic, and social sustainability. In addition, they must design for a planet with limited resources, complex problems, and increasing environmental concerns, while maintaining an obligation to deliver quality work, professionalism and protect the common good. The main contributor of greenhouse gas emissions stem from the production of structural engineering materials: cement, steel, masonry, and wood. Cement in particular, has been the leader in building materials throughout the years; it has nearly quadrupled since 1970 and is expected to continue trending upward. Cement contributes approximately 5% to 10% of the global CO2 emissions. Structural materials provide the structural engineer with real opportunities to contribute to a project's sustainability. During the design phase, the structural engineer can affect the sustainability of the project through choosing locally available resources, the recyclability and reusability of materials, the efficiency of structural systems, and informed choices of demolition and preservation.

Rapid chloride penetration test in concrete (8 minutes)

Spencer Chung

Abstract

Chloride penetration in concrete is a problem we face when the issue of serviceability arises. When it happens, reinforcing bars in the concrete become corroded and cause spalling and general deterioration of structures. This is especially a cause for concern in today's bridges. Most bridges we drive on in Hawaii were designed for 50-year life spans, which most of them are at today. The chloride penetration test will allow us to test different concrete mix designs to determine a mix which will hold chlorides from affecting the reinforcing in the concrete for 100 years. Chlorides will rapidly be injected into concrete test cylinders over a given test time, then the cylinders will be broken apart and sprayed with silver nitrate to see how far the chloride has penetrated into the concrete.

Proposed Changes to Punching Shear Strength of Reinforced Concrete (8 minutes)

Katrina Higa

Abstract

Flat slab floor systems are a popular choice for high rise buildings because of the ease in which they can be constructed and the reduced floor-to-floor story height. Although flat slab systems have been used for decades, their behavior is not fully understood. Laboratory testing has found that deeper slabs do not consistently reach the shear capacity that is predicted by the ACI-318 equations. This decrease in shear capacity is thought to be caused by the presence of unreliable concrete within the slab. The ACI-318 building code does not currently include this decreased capacity when using larger slab depths. To account for this, it is proposed that a depth effect factor be included in the punching shear equations when the effective depth of the slab is greater than 9 inches. In this presentation, I will discuss the proposed amendments to the ACI 318 punching shear design equations.

PZT and Beam Vibration (8 minutes)

Ryan Hobson

Abstract

My research involves determining the validity of using the shear mode of beam deformation to obtain electrical potential. PZT is the material that we are focusing on utilizing to transfer mechanical energy into electrical potential. In short, what happens with this material is when strain occurs across the lattice, electrical potential develops at polar ends. This electrical potential can be harnessed or stored to power sensors or other low consumption devices. Currently, this technology is already being applied to vibrating structures, my research involves trying to figure out if there is a more efficient way.