# AGENDA – Spring 2012 MEETING
# ACI 408 – Development and Splicing of Deformed Bars

Sunday, March 18, 2012
8:30-11:30 am
Windsor Room
Hyatt Regency Dallas

1. Welcome
2. Introductions
3. Approval of the minutes from the Fall 2011 Convention in Cincinatti
4. Membership changes
5. Report subcommittee 408-A
6. "Bond under Cyclic Loads (ACI 408.2R-92) (Reapproved 2005)"
7. "Mechanical Reinforcing Bar Anchorage" ACI 408.4R-XX
9. ACI 408-03 Bond and Development of Straight Reinforcing Bars in Tension
10. Technical sessions:

    - Recent Developments in Bond Splice Tests. Fall 2011 Cincinnati.

    - Symposium Honoring James Jirsa's Legacy in Structural Concrete: A Time to Reflect: Bond and Development Length. Spring 2012 Dallas

    Monday, March 19, 11:00 a.m. to 1:00 p.m., Reunion C

    - Structures Congress.

    - Bringing reinforcing bar anchorage into the 21st Century

11. Research presentations:

    Bond Strength of Reinforcing Bars with High and Low Alternating Ribs. Oan Chul Choi.

12. Other business
13. Next meeting
14. Adjournment

Meeting of Subcommittee 408-A. Mechanical Reinforcing Bar Anchorages and Splices. Sunday March 18, 8:00 to 8:30 am, 359 McComas Bluff Room, Hyatt Regency Dallas

# Symposium Honoring James O. Jirsa's Contributions in Structural Concrete: A Time to Reflect, Part 2: Bond and Development Length

## Monday, March 19, 11:00 AM - 1:00 PM, REUNION C

During the last 45 years, Professor James O. Jirsa has had a long and distinguished career as professor of civil engineer and as advisor of numerous students at the University of Nebraska, Rice University, and at the University of Texas at Austin. In all these years, he has been at the forefront and has made outstanding contributions to structural engineering in both concrete research and design. His contributions to reinforced concrete span many areas, most notably is his work in slabs, shear, bond and development length, and the seismic strengthening of reinforced concrete elements and systems. As a member of ACI, he has served as chair of many technical committees (TAC, 318F, 408, 352), been a member of the building code committee since 1982, has been a board member, and is a past president of the Institute. Moreover, he is Honorary Member of the Institute. Students, researchers, practicing engineers and contractors are expected to attend. Material to be presented would cover state-of-the-art knowledge in the areas indicated above. By attending this session, attendees will be able to: 1. Explain state of the art approaches for the design of structural concrete. 2. Demonstrate different rehabilitation schemes for building and bridge structural systems. 3. Specify experiments and nonlinear analyses for improving earthquake safety. 4. Recognize the the role of large scale testing in the development of building code provisions.

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**The Hand of God is in the Details**

**Presented by:** John Breen

**Affiliation:** University Of Texas

**Description:** Some reminiscences of the contributions to reinforced concrete detailing that made Jim Jirsa legendary.

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**Comparative Bond Studies of NSC Beam-Column Joints Confined with Stirrups, Steel Fibers or FRP Sheets**

**Presented by:** Bilal Hamad

**Affiliation:** American University Of Beirut

**Description:** The paper presents an overview of the study carried out to compare the results of three research programs conducted on hooked bars anchored in beam-column joints in normal strength concrete (NSC) structures at the American University of Beirut (AUB). The specimen simulated the rigid connection of a cantilever beam to a column. In the first program, the beam-column joint was confined externally with carbon fiber reinforced polymer (CFRP) sheets. Confinement of the joint in the second program was provided internally by steel fibers of varying volume fractions incorporated in the concrete mix. Although stirrups were included in the beam and column elements of the beam-column specimens of the first two research programs, however the column stirrups were not extended in the beam-column joint. In the third program, confinement of the joint was provided internally by different amounts of stirrups within the beam-column joint. Test results of the three programs indicated positive effect of the different confining modes on the bond strength of the anchored hooked bars and ductility of the loaddeflection history of the tested specimens. The objective of the study reported in the paper is to perform a correlation between the positive effects of the three different investigated confining modes of the beam column joint.

**Towards a Rational Theory of Bond**

**Presented by:** Robert Frosch

**Affiliation:** Purdue University

**Description:** Bonding of reinforcement to concrete is fundamental to reinforced concrete structures. However, the mechanism by which bond occurs remains unknown. Research investigating bond strength dates back approximately 100 years to the studies of Duff Abrams. While major strides have been made in understanding the variables that influence behavior and the modes of failure, a rational theory remains elusive. The objective of this presentation is to explore our history and look towards a rational theory. In addition, the influence that Jim Jirsa has had on both research and practice in this area will be discussed.

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**Bridging the Gap Between Design Provisions for the Development of Reinforcing Bars and for Anchorages**

**Presented by:** Rolf Eligehausen

**Affiliation:** University of Stuttgart

**Description:** Bonded anchors are steel elements (e.g. threaded bars) which bonded into a drilled hole by an adhesive mortar. They are designed according to ACI 318 Appendix D. Reinforcing bars post-installed in drilled holes by a suitable mortar behave like cast-in reinforcing bars. They are designed according to ACI 318 Chapter 12. Likewise, headed anchors are designed according to Appendix D while headed reinforcement is designed according to Chapter 12. In many applications (e.g. connection of a column or wall loaded by a normal force and a bending moment to the foundation) bonded or headed anchors have the same task as post-installed or headed reinforcing bars, namely transfer of the tension force of the connected structural member to the base member (in the above given example transfer of the column tension force to the foundation). Therefore the required embedment depth should be about the same, independent if the connection is designed according to Appendix D or Chapter 12. In the paper the provisions for anchorages with bonded or headed anchors according to Appendix D will be compared with the provisions for the development of reinforcing deformed bars according to Chapter 12 and differences in the design assumptions will be pointed out. At the University of Stuttgart extensive experimental and numerical investigations on the behaviour of joints between a column or wall and a foundation under monotonic loading have been performed. Used were cast-in straight and headed reinforcing bars as well as headed anchors and post-installed reinforcing bars. The results will be compared with predictions according to Chapter 12 (development of bars) and Appendix D (anchorages). Furthermore, based on the results of these comparisons, proposals for a better harmonization of the provisions in Chapter 12 and Appendix D will be given.

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**Variation of Tensile Force with Localized Damage in Grouted Post-Tensioned Tendons**

**Presented by:** Sharon Wood

**Affiliation:** University of Texas at Austin

**Description:** Over the past decade, significant structural damage has occurred in external, post-tensioned tendons in several bridges in the US. While the damage cannot be detected from a visual inspection, the transverse natural frequencies of tendons have been used to distinguish between damaged and undamaged tendons. A laboratory investigation was conducted to determine the sensitivity of the measured natural frequencies and the tensile force in grouted post-tensioned tendons to localized damage. Large-scale specimens were constructed using seven-wire prestressing strands and commercial anchorage devices. Damage was induced using a galvanic corrosion cell to fracture one wire at a time. The residual tensile force and natural frequencies were measured as the damage 198 accumulated. The results of the investigation will be summarized and the implications for nondestructive evaluation of grouted tendons addressed.

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**JOJ - Steady High Quality Research on Reinforcing Bar Behavior**

**Presented by:** Donald Meinheit

**Affiliation:** Wiss Janney Elstner Assoc

**Description:** Dr. James O. Jirsa's initials red the same forward and backward. Therefore, no matter how you look at him you get the same result. For over 40 years, JOJ has conducted consistently high quality research studies whose results have found their into our building code design requirements. This paper is a brief review of a few of the topics that have been implemented in ACI 318.