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Use of FRP as internal shear reinforcement of concrete elements

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Hybrid Seminar: **Room A2**, MS Teams
Live Streaming: DIAVLOS, YouTube

Abstract: Owing to the unique mechanical characteristics and lack of plasticity of fiber-reinforced polymers (FRPs), relatively large strains can develop in FRP reinforced concrete (RC) elements at ultimate limit states and this can lead to different relative contributions of concrete and shear reinforcement to the total element's shear capacity. This presentation examines the development and relative contribution of the main shear resisting mechanisms in concrete beams with different overall depths and reinforced with longitudinal and transversal FRP reinforcement. Complementary strain measurements obtained from digital image correlation (DIC) and strain gauges are presented and discussed thoroughly. Although current FRP shear design approaches rely on the assumption that the contributions of concrete and shear reinforcement are constant up to failure, their relative magnitude is found to vary with increasing crack width. The experimental results indicate that, when minimum shear reinforcement is provided, current shear models based on a fixed truss angle approach tend to overestimate the contribution of concrete and underestimate the contribution of shear reinforcement. The use of a variable angle truss model, along with an appropriate reduction in the contribution of concrete, would lead to a more reliable estimate of the main shear resisting mechanisms and optimal design of the required amount of shear reinforcement.