Introduction and Objectives
To quantify the static and dynamic behavior of restrained UHPC slabs considering compressive membrane action through experimental and numerical analysis.

Objectives
- Perform static and shock tube precision testing on NSC, Cor-Tuf1 and Cor-Tuf2 push-off one-way slab specimens
- Compare test data to previous theoretical and empirical models
- Propose changes to the models if required

Research Approach
- 27 reinforced concrete slabs constructed and tested
  - 11 quasi-static tests (5 SS and 6 RR)
  - 16 dynamic tests (9 SS and 7 RR)
- Compare experimental data to existing compressive membrane theory predictions
- Conduct SDOF analysis with existing fast running engineering codes to compare response predictions
- Modify resistance function to resemble experimental data
- Conduct finite element analysis to assess current material model's capability to capture response of UHPC

Conclusions
- For UHPC slabs whose compressive strength is in excess of 20 ksi, length to depth ratio is 10 < L/h < 20, a good rule of thumb estimate for Δuc is 0.5h.
- An alternate approach of determining the deflection that occurs at ultimate capacity was developed based on Keenan’s[10] strain-deformation approach:

  \[ \delta = \frac{x_0 (x + t)}{3.5c_{\text{m}}} \]

  \[ \delta = \frac{x_{\text{m}} (x + t)}{3.5} \]

  Once the deflection at ultimate capacity has been determined from the above equation, either Park’s equation or Equations 10-38 and 10-39 found in Army TM 5-855-1 may be used to determine the value of ultimate resistance and beyond to snap-through point.