POLYMER EMULSIFIED CONCRETE (PEC)

- **Concrete - the most widely used construction material with limitations:**
  - low tensile strength
  - low failure strain, i.e. brittle
  - susceptibility to freeze-thaw effects
  - low resistance to chemicals
- **Polymer Modifications**
  - polymer impregnated concrete (PIC)
  - polymer cement concrete (PCC)
  - polymer concrete (PC)
- **Fiber Reinforced Concrete (FRC)**
- **A New Concept – Improving the tensile ductility of concrete using emulsified flexible polymers (PEC)**

Polymer Emulsified Concrete (PEC)

Objective

- To use emulsified flexible polymers, at 1-3wt% of cement, by a standard mix design, to improve the tensile ductility and damage tolerance of conventional concrete for general construction applications.

Significance

- Development of PEC with higher damage tolerance (ductility, energy absorption, impact resistance)
- Overcoming the brittleness of conventional concrete - a bottleneck hindering structural performances
- Reducing catastrophic failures of our Nation's constructed facilities

Work in Progress

Polymer Emulsified Concrete With Improved Tensile Ductility

Preliminary research has demonstrated that the concept is a great success in terms of the fracture behavior of concrete samples wherein failure is ductile for PEC while in conventional concrete failure is brittle and explosive.

Photos showing ductile after-fracture-appearance and deformation around the cracks with non-shattering effect for concrete cylinders with ~1wt% of emulsified polymers

WestVirginiaUniversity

Liang, 2004

CFC