### Background

- CCEFP Test Bed 3 performs research on the development of Hydraulic Hybrid Passenger Vehicles
- The EVPS (Earth Moving Vehicle Powertrain Simulator) can simulate the behavior of a vehicle’s engine, motor, and other
  - Hydraulic Hybrids can use a gas-charged accumulator for energy storage and more efficient regenerative braking than an electric motor

### Goals

- Create simulations for current hardware:
  - Electric Motor (models ICE)
  - Variable Displacement Pump
  - Hydraulic Motor
- Improve on past models and modify them to include a gas charged accumulator

### Research Plan

- Model of previous EVPS components:

  ![Simulation diagram](image)

  - Compare this model to previous results in both transient and steady states
- Model of the hydraulic accumulator incorporated into EVPS model

  ![Model diagram](image)

  - Verify models with experiments on the EVPS

### Research Results

- Simulation of components not including the accumulator yields similar results to previous simulations

  ![Simulation graph](image)

- Completed basic models of the hydraulic accumulator and incorporated it into the EVPS simulation

  ![Model graph](image)

### Fundamental Questions/Challenges

- How can one model the behavior of the EVPS, and an actual hydraulic hybrid powertrain?
- How should the hydraulic accumulator be incorporated into the current models?
- How does varying the possible inputs to the simulator (the throttle angle, pump input voltage, and proportional flow valve input voltage) affect the simulator?

### Future Research

- Utilize an accumulator in the EVPS to compare the models to experimental results
- Make improvements to improve the accuracy of the current accumulator simulink model
- Update hardware to more realistically simulate a hydraulic hybrid powertrain