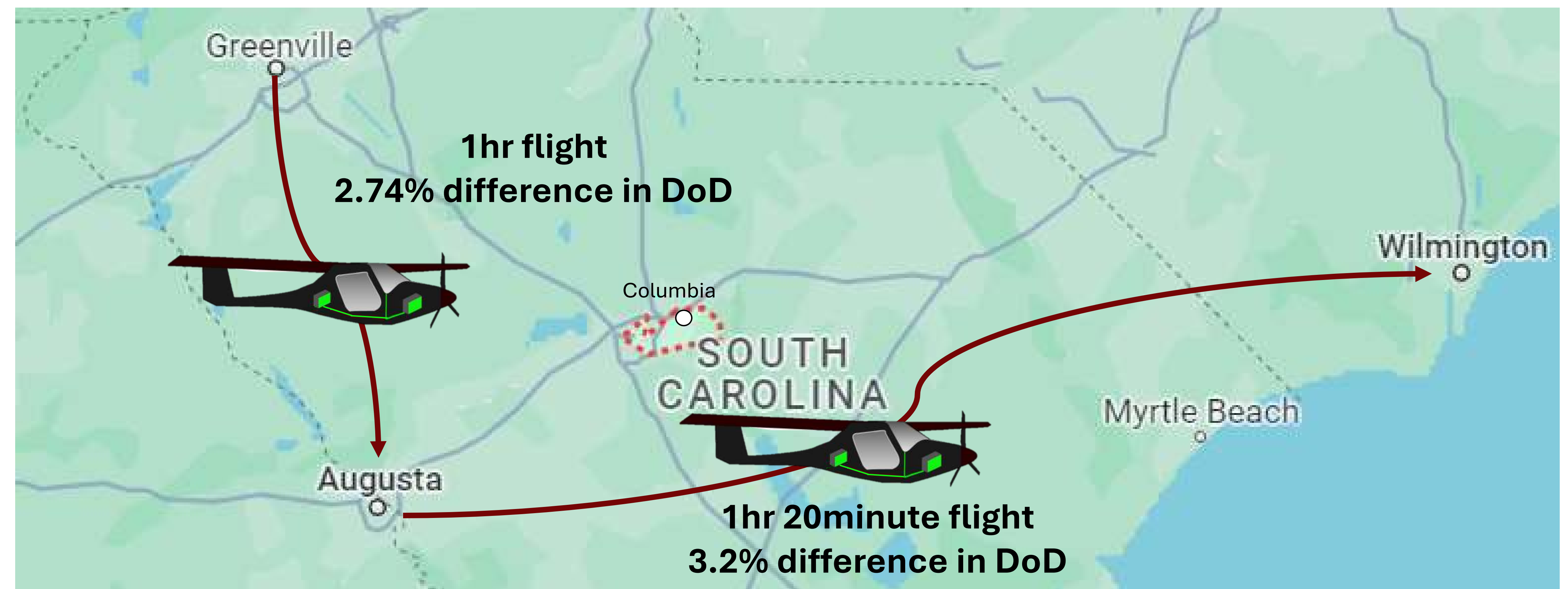


Background

- In transportation, electrification has become a driving force in the quest for sustainability which can be seen in automobiles and aircraft.
- This research aims to optimize the use of batteries in small electric aircraft with digital models simulated in MATLAB – Simulink.
- Using this model, we can see the effects of varying flight plans and loads on the overall system especially the battery.
- The degradation model could also represent the battery behavior through short flights around South Carolina

Flight Routes



6-seat light aircraft

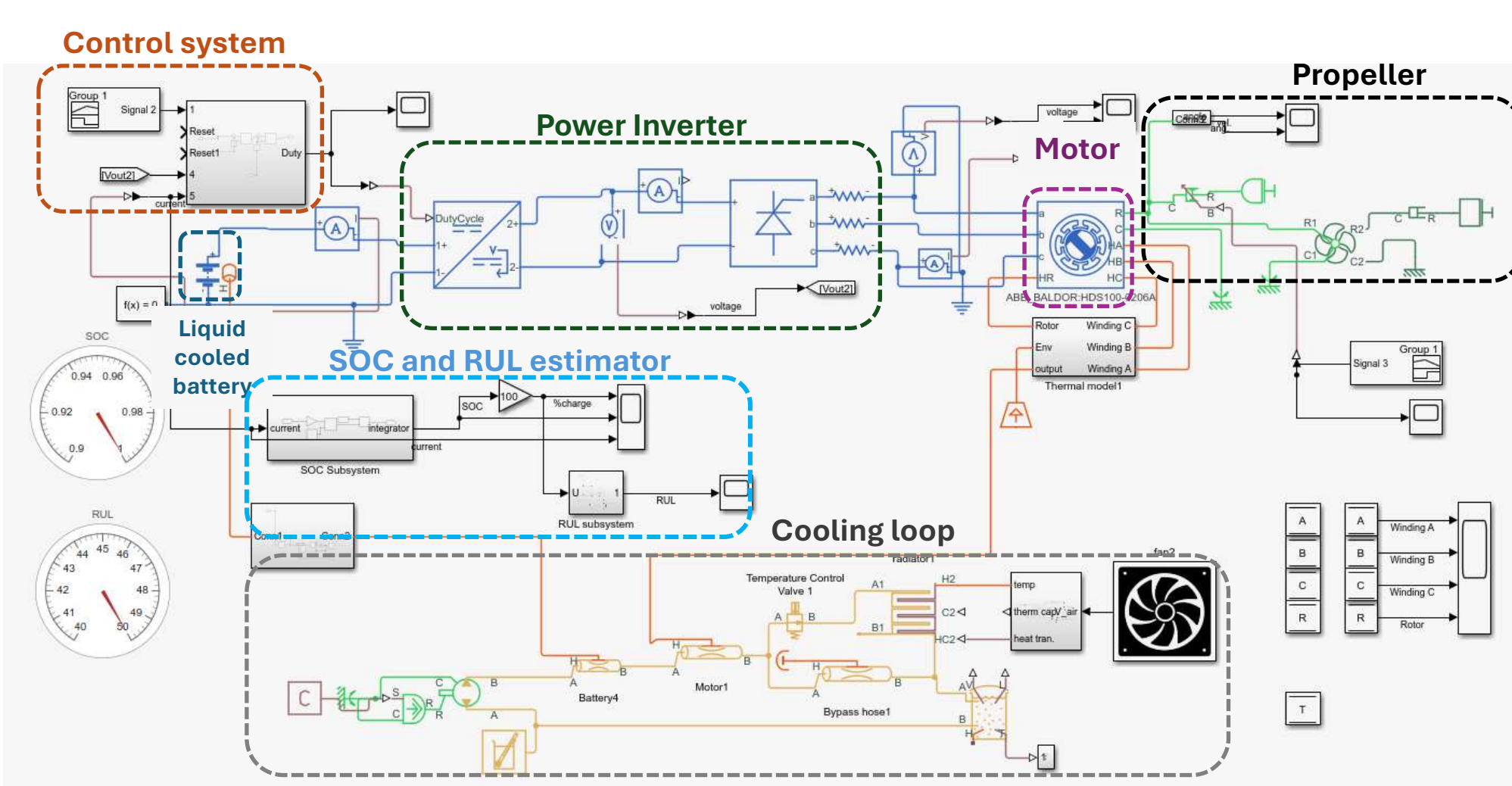


Cessna 206 Stationair

<https://cessnaferrypilot.com/>

- A 6-seater electric aircraft based on the performance of a Cessna 206 was used to model an assumed battery-power aircraft
- 300 horsepower (220 kW)
- Max speed: 280 km/hr
- Cruise speed: 262 km/hr
- 1352km range with a 45 minute reserve
- Battery capacity would be about 110 Kilowatts-hour

Multi-domain model

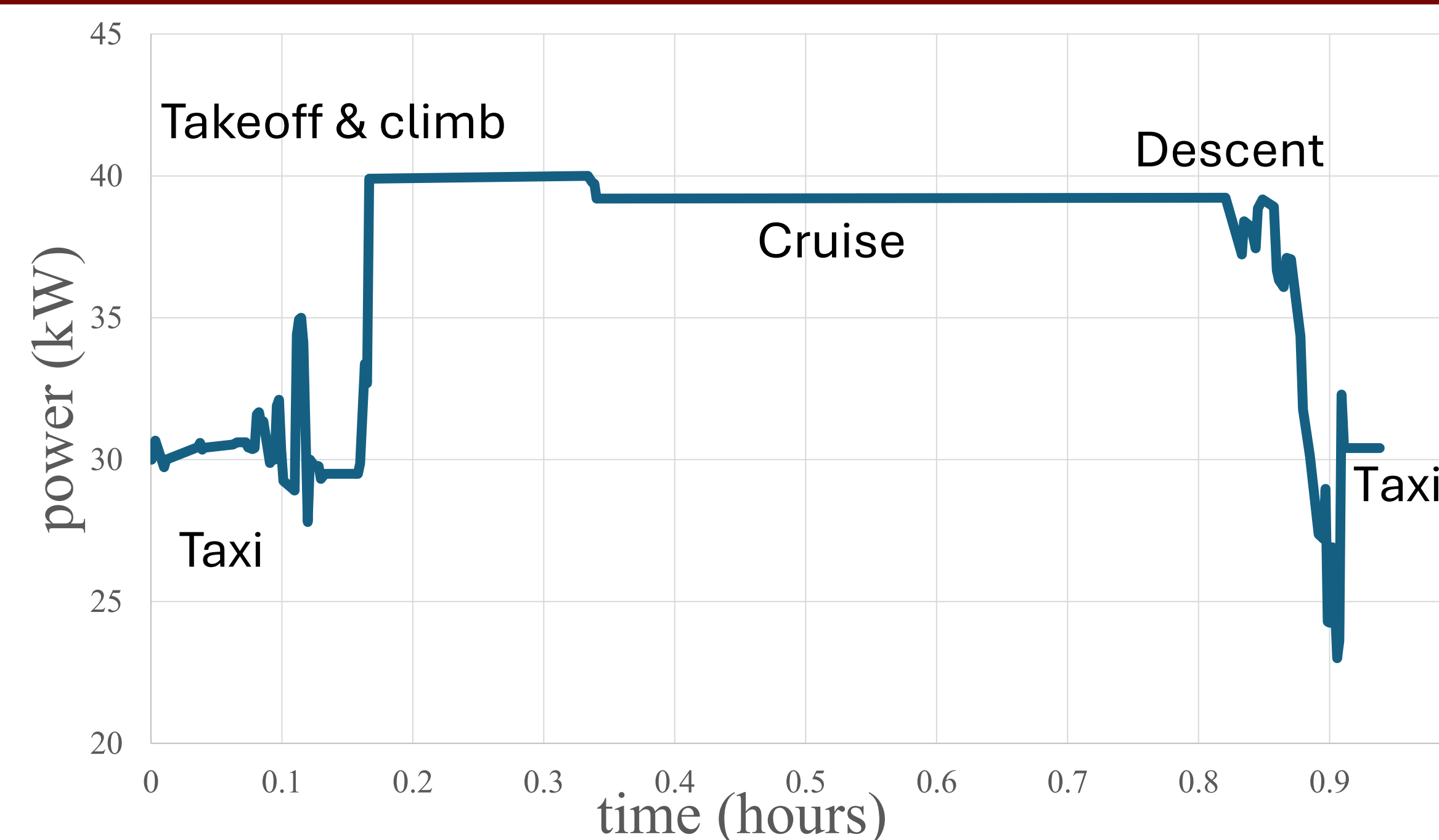


Multi-physics electric aircraft model

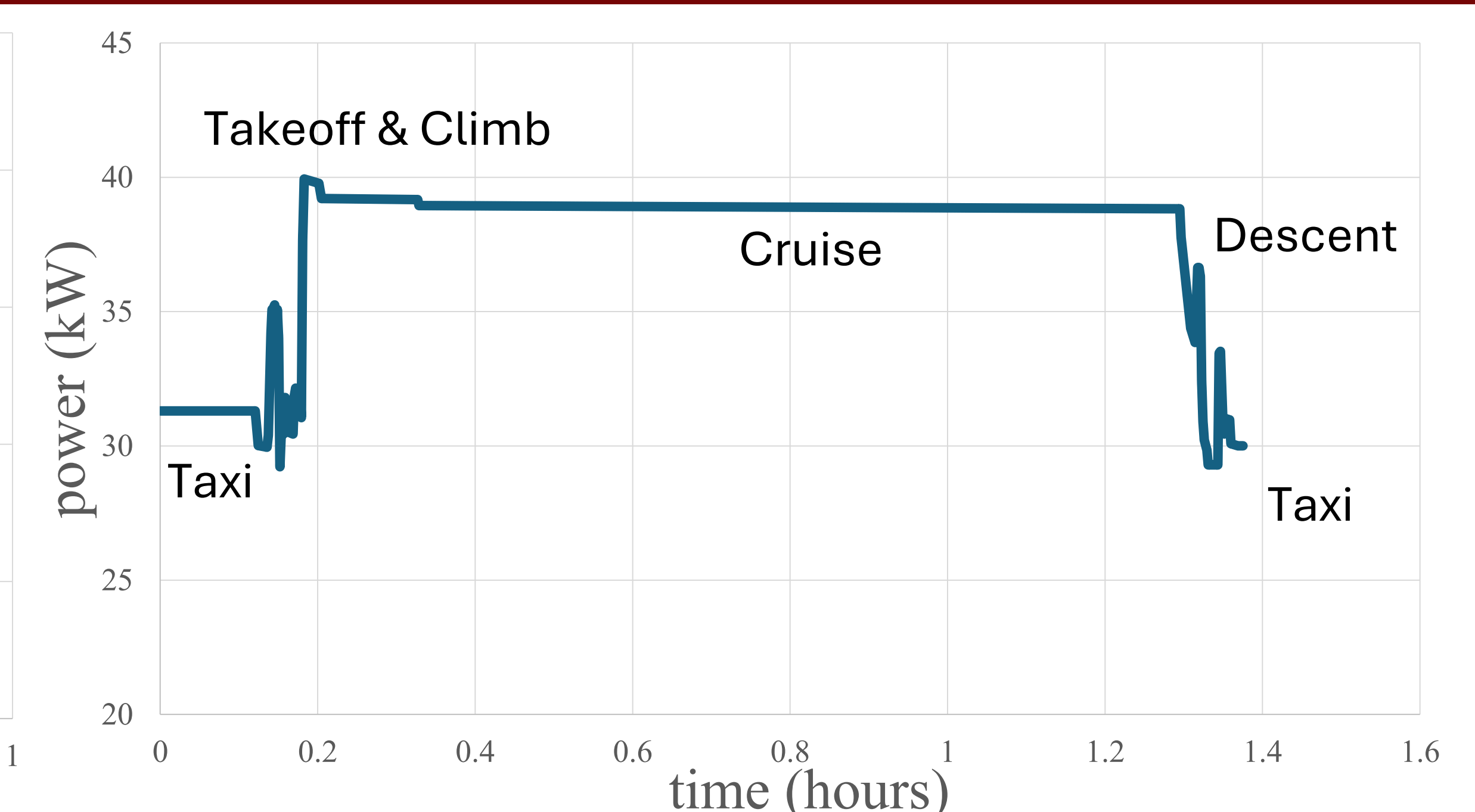


Model repository

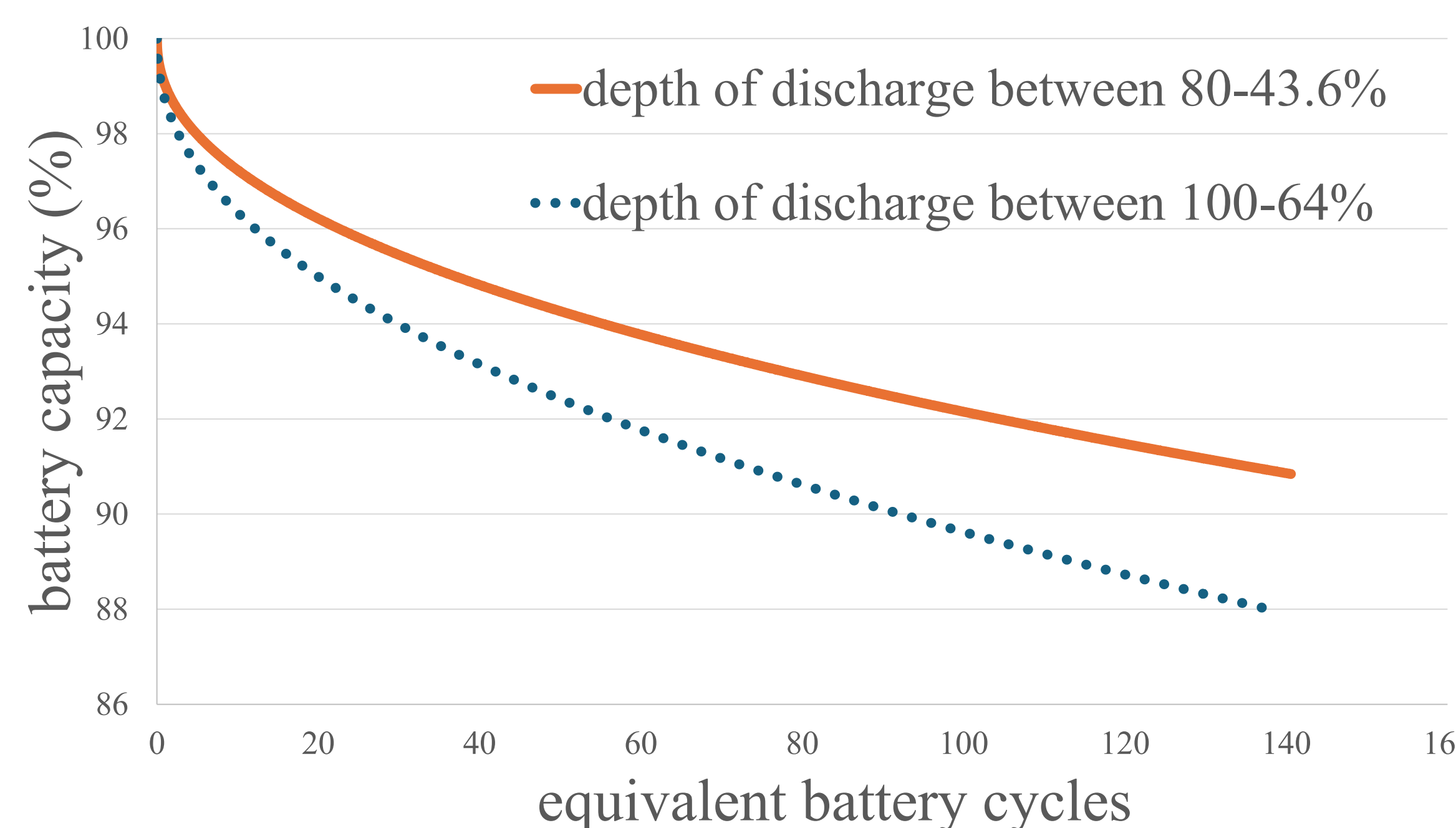
Results



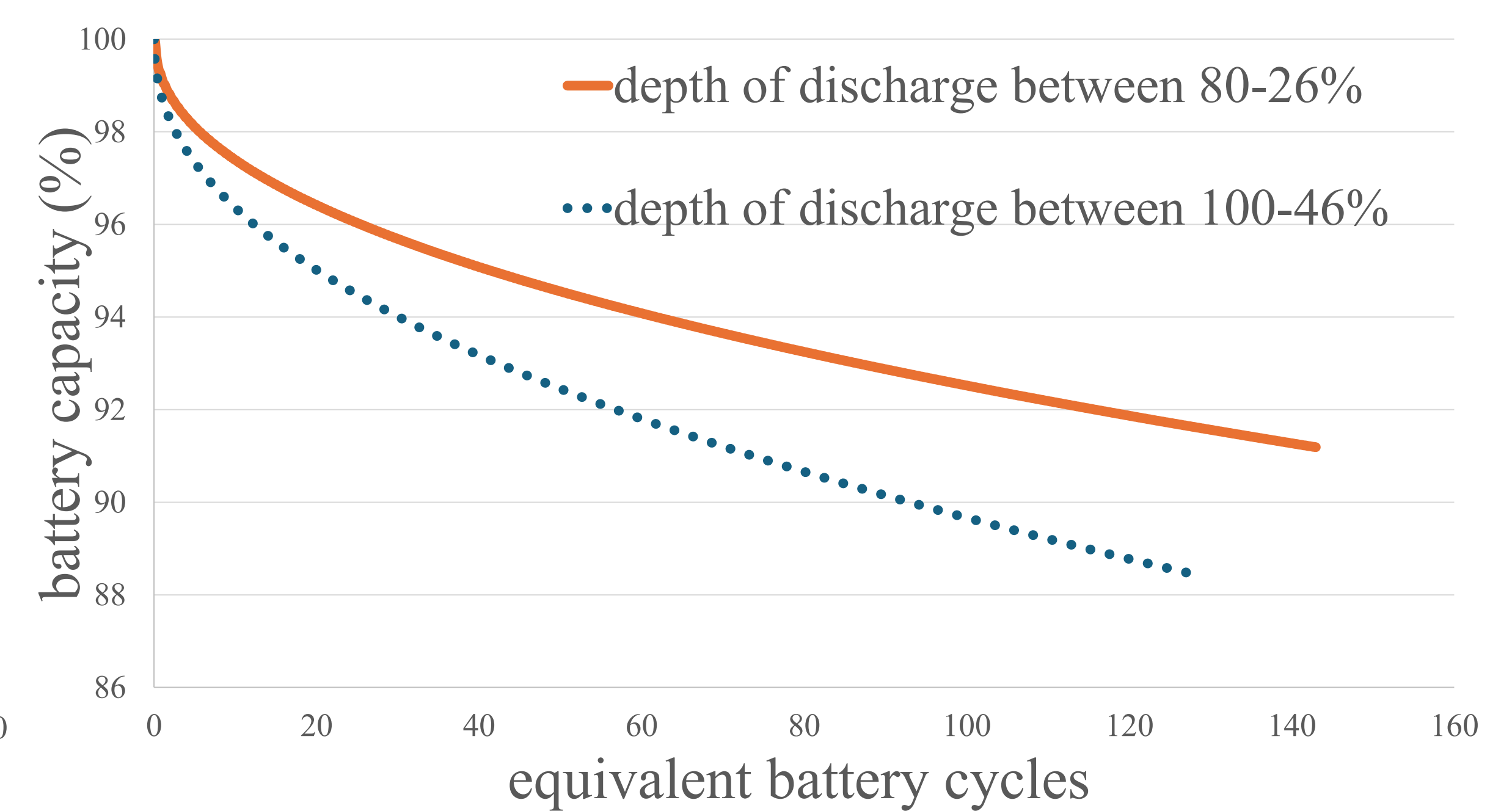
Load profile – Greenville, SC to Augusta, GA



Load profile – Augusta, GA to Myrtle Beach, SC



Battery degradation – Greenville, SC to Augusta, GA



Battery degradation – Augusta, GA to Myrtle Beach, SC

- Presented are load profiles of flight routes around South Carolina
- Degradation variance is predicted at 100% charge and 80% charge
- Overall degradation is dependent on the depth of discharge per flight
- Longer continuous discharge will cause more degradation irrespective of SOC range