Optimum Control Strategies for PHEVs

AVTAE Merit Review
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Project Description

- Develop vehicle level control strategies to properly evaluate the benefits of the PHEV technology.
Funding

- Present (FY08) DOE funding ($300K)
- Expected future DOE funding ($300K/yr) for 3 years
- Total funding prior to FY08 ($200K)
Objectives

Use Global and Heuristic Optimization Tools to Assess the Benefits of Different PHEVs Controls.
Milestones

- Evaluate impact of battery power and energy on fuel efficiency
- Define which parameters have the most impact on engine ON logic
- Define how the engine should be operated
Relevance

- Development of realistic control strategies required to properly evaluate the PHEV technology benefits.
- Using non-optimized control would diminish the value of the program.
Barriers

- Drive quality and emissions have significant impact on final control, but are difficult to taken into account in simulation.
- Transferring logic from global optimization to rule based control difficult due to influence of drive distance.
Approach

1. How much better fuel efficiency can we obtain using blended compared to EV and charge-sustaining?
2. Knowing the drive cycle, how close can we be from the optimum?
3. Not Knowing the drive cycle, how can we estimate the trip type, distance...?
Accomplishments and Progress

- Demonstrated the benefits of using blended control rather than EV mode for distances greater than the AER.
- Evaluated impact of battery energy and power on fuel efficiency.
- Engine On/Off is linked to wheel power demand and available electrical energy.
- When used, engine should be operated at high efficiency.
Future Plans

- Evaluate different options to estimate the trip distance for rule based control.
- Options will be evaluated using real-world driving cycles.
- Implement/Test controls in hardware based on tools availability and tasks priority.