

Abstract Submitted  
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**Improving E85-Engine Performance and Efficiency** K. HUANG, R. TAO, Temple University — E85 is an important alternative fuel with 85% ethanol and 15% gasoline. However, it is widely reported that E85 vehicles have difficulties to start in winter. There are also complains about the E85 engine performance. Here we report that with proper application of electrorheology, we can solve these issues and improve the engine performance. E85 vehicles all have port injected engines. The fuel is injected into cylinders as droplets. Before the ignition, the fuel evaporates. Because E85 is more viscous than gasoline, the injected E85 droplet size is not small. Especially, in the winter the cold weather makes the viscosity even higher, leading the E85 droplets even bigger. Since evaporation starts from the droplet surfaces, large droplets are difficult to be evaporated before the ignition comes. When there is no enough fuel vapor, the engine cannot start. To solve this problem, we introduce a small device just before the fuel injection, which produces a strong electric field to reduce the fuel viscosity, leading to much smaller fuel droplets in atomization. The evaporation is much faster and the engine is easier to start. After the engine is started, the warm metal surfaces help evaporate the fuel and the engine operates fairly well. As the small fuel droplets produced by our device make the combustion fast and timely, engine efficiency and performance are also improved.

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