PERFORMANCE EVALUATION OF THE DELPHI NON-THERMAL PLASMA SYSTEM UNDER TRANSIENT AND STEADY-STATE CONDITIONS

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A non-thermal plasma (NTP) exhaust aftertreatment system, consisting of a diesel particulate filter (DPF), NTP reactor, power supply, controller, catalyst, and NO_x sensor, was developed to reduce the emission of oxides of nitrogen and particulate (PM) matter for diesel engines. The goal of the project was to reduce NO_x by 80 percent and PM by 90 percent with a maximum fuel economy penalty of 3 percent. System development was conducted on a 2.2-liter light-duty, common rail, diesel vehicle using steady-state and transient emission tests. The total NO_x emission reduction on transient testing over the European MVEG cycle averaged 15 percent, with a fuel economy penalty of 8 percent. DPF regeneration using the NTP was demonstrated under steady-state conditions at exhaust temperatures greater than 280°C. A comprehensive analysis of the vehicle emission data will be presented.