1. Introduction

It is well known that no other internal-combustion engine is widely used as the Diesel engine. This is due primarily to its high degree of efficiency and resulting fuel economy. The chief areas of use for Diesel engine are fixed-installation engines, cars and light commercial vehicles, construction and agricultural machinery, and so on. Diesel engine are produced as inline or V-configuration units. They are ideally suited to turbocharger or supercharged aspiration as, unlike the gasoline engine, they are not susceptible to knocking.

To comply with the current regulations on particulate matter emissions, Euro V vehicles need the adoption of Diesel Particulate Filter (DPF), which highly reduces the particulate matter (PM) emissions, but needs to be periodically regenerated. The regeneration procedure [1] can be performed either “on vehicle” by increasing the exhaust gas temperature or by taking off the DPF device from the vehicle. The “on vehicle” regeneration procedure causes several problems [7,11], such as engine oil dilution and high fuel consumption while the external regeneration implies that the vehicle cannot be operational for several hours.

The regeneration process of a DPF [1–3] requires the combustion or the oxidation of the carbon rich particles which have been collected in the filter. Generally an increase of temperature in the filter to the ignition temperature of a certain amount of the particles, together with the supply of oxidizers (oxygen or NO2), permits the DPF regeneration. There are three important temperature variables for a DPF [3]:

- the “light off” temperature, below which catalyst activity is too low to oxidize HC (ranging around 200 °C);
- the NO to NO2 conversion temperature range (defined as the minimum and the maximum temperature at which 40% or greater NO conversion is achieved). The highest NO conversion occurs at medium temperatures of about 250–350 °C.