**TITLE:** EFFECTS OF INLET TEMPERATURE AND CHANNEL GEOMETRY ON THE EFFICIENCY OF A CATALYTIC CONVERTER

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-This study is prepared for oral presentation in ICAEE 2014.

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# EFFECTS OF INLET TEMPERATURE AND CHANNEL GEOMETRY ON THE EFFICIENCY OF A CATALYTIC CONVERTER

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## ABSTRACT:

Environmental pollution is a problem of all civilized countries. Air pollution is a part of the problem and many researchers are working in the control of air pollution of various sources. One of these sources is vehicles. Some researchers are working on more efficient, less pollutant engines; some are working on developing the strategies and control techniques to satisfy the regulations about pollutants. During the cold start of an engine, the exhaust gas air pollutants are in high levels. Catalytic converter channels have square cross-sections. In this study, a catalytic converter channel was analyzed numerically by using a commercial CFD code. Inlet temperature of the channel was changed, and then the efficiency of a catalytic converter was calculated. All calculations of reduction of methane gas in the exhaust gas were modeled using twenty four equation surface reaction model. Every reaction is defined in the interface of the CFD code. Since the channel cross section was small enough, Reynolds number was less than 2300, the flow in the channel was considered to be laminar. SIMPLE algorithm is employed. The conversion efficiency of the catalytic converter was calculated on the reduction carbon monoxide and hydrocarbons, respectively, for each case. After the results were obtained for square cross-sectioned channel, the channel geometry was changed as triangular and oval cross-sectioned channel designs. The designs were constrained by same hydraulic diameter as square cross sectioned channel. The effects of inlet temperature and channel cross section on the conversion efficiency of a catalytic converter were investigated. The results are presented in terms of contours of species concentrations, velocity, pressure and temperature. It is seen that when the inlet temperature of the catalytic converter increased, the conversion efficiency increases as expected. In addition, the results were also compared with the results found in the literature, and observed that results are consistent with them.