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A Hybrid Combustion Chamber Design for Diesel Engines

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Abstract : Both DI and IDI systems possess inherent advantages as well as disadvantages. The objective of the present work is to obtain maximum advantages of both systems by implementing a hybrid design. A hybrid combustion chamber design consists of two combustion chambers viz., the main combustion chamber and an auxiliary combustion chamber. A fuel injector supplies major quantity of fuel to the auxiliary chamber. Due to the increased swirl motion in auxiliary chamber, mixing becomes more efficient which contributes to reduction in soot/particulate emissions. Also, by increasing the fuel injection pressure, NOx emissions can be reduced. The main objective of the hybrid combustion chamber design is to merge the positive features of both DI and IDI combustion chamber designs, which provides increased swirl motion and improved thermal efficiency. Due to the efficient utilization of fuel, low specific fuel consumption can be ensured. This system also aids in increasing the power output for same compression ratio and injection timing as compared with the conventional combustion chamber designs. The present system also reduces heat transfer and fluid dynamic losses which are encountered in IDI diesel engines. Since the losses are reduced, overall efficiency of the engine increases. It also minimizes the combustion noise and NOx emissions in conventional DI diesel engines.

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