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MODELING AND PARAMETRIC STUDIES OF HYDROGEN FUELLED MULTICYLINDER S. I. ENGINE CONSIDERING WITH THE EFFECT OF EQUIVALENCE RATIO USING ORDINARY DIFFERENTIAL EQUATIONS

CHINTAN R. PATEL[1], VIKAS J. PATEL[2], NISHITH R. RATHODL[3] & S. A. CHANNIWALA[4]

[1,2,3,4]CK Pithawala College of Engineering and Technology, Surat, Gujarat, India

[5] Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat, India

ABSTRACT

In more than 100 years of evolution of the automobile, the times we live in today - at the start of a new century - may ultimately take the form of a true “sequel to the beginning” in a larger story of transportation history. After all, even after so many dramatic technological breakthroughs in the 20th century, much of what took place underneath the sheet metal of global automobiles was relatively incremental in nature. The benefits of using hydrogen are thus simple and clear - used in power generation or as a vehicle fuel, it contains nothing that pollutes and so all emissions are dependent on the way in which it is combusted. Widespread use of hydrogen could therefore have a significant impact on urban pollution. Fossil and nuclear fuel reserves are becoming increasingly limited, and the world's energy future will have to include several renewable alternatives to these failing resources. A promising possibility is to exploit the energy potential of the most plentiful element in the known universe — **HYDROGEN**.

The two main motivating reasons for development of hydrogen fuelled I.C. engine and to build a necessary infrastructure are

- Hydrogen, insight of its unlimited supply potential, will be key fuel in future sustainable energy systems that will rely on renewable energy resources.
- The extraordinarily clean combustion properties along with zero emissions have minimal environmental impacts.

In this paper, all the four basic processes taking place in an S.I. engine are analyzed and the values of pressure and temperature at every 2° of crank rotation are found out with the aid of certain assumptions. The model involves good deal of calculations and iterations and hence, it is coded in ‘c’.

It also explains the results obtained from simulation and discussion related with the results. It compares the predicted results of simulation with ideal Otto cycle. It is manifested that the ideal Otto cycle is ineffective in simulating combustion in a S.I. engine. The mass fraction burned commencing at the end of ignition lag calculated using Vibe function, gives quite good correlation with analytical results. The volumetric efficiency is 89%, which shows the role of friction losses in the intake system of the engine.

KEYWORDS: Computer Simulation, Mathematical Model, Delayed Entry Technique, Hydrogen Fuel