NUMERICAL SIMULATION OF FLOW PATTERN AND HEAT TRANSFER MECHANISM FROM A HEATED CYLINDER IN CROSS FLOW

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We certify that the project entitled *Numerical Simulation of Flow Pattern and Heat Transfer Mechanism from a Heated Cylinder in Cross Flow* is written by Abang Ma'aruf Bin Abang Bussri. We have examined the final copy of this project and in our opinion; it is fully adequate in terms of scope and quality for the award of the degree of Bachelor of Engineering. We herewith recommend that it be accepted in partial fulfilments of the requirements for the degree of Bachelor of Mechanical Engineering.

Mr. Devarajan Ramasamy
Examiner

…………………………
Signature
NUMERICAL SIMULATION OF FLOW PATTERN AND HEAT TRANSFER MECHANISM FROM A HEATED CYLINDER IN CROSS FLOW

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Report submitted in fulfilment of the requirements for the award of the degree of Bachelor of Mechanical Engineering

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NOVEMBER 2009
SUPERVISOR’S DECLARATION

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering.

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STUDENT’S DECLARATION

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged. The project has not been accepted for any degree and is not concurrently submitted for award of other degree.

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LIST OF SYMBOLS

\( \Omega \) Collision operator
\( \rho \) Density
\( \rho_f \) Body force
\( \nu \) Kinematic viscosity
\( \tau \) Single relaxation time
\( \chi \) Thermal diffusity
\( c \) Macroscopic velocity
\( t \) Time step
\( f \) Density distribution function
\( F \) Forcing terms
\( f^{eq} \) Equilibrium density distribution function
\( g \) Internal energy distribution function
\( G \) Pressure gradient
\( g^{eq} \) Equilibrium internal energy distribution function
\( P \) Pressure
\( Ra \) Rayleigh Number
\( Re \) Reynolds Number
\( Pt \) Prandtl Number
LIST OF ABBREVIATIONS

BC  Boundary Condition
BGK  Bhatnagar-Gross-Krook
LBE  Lattice Boltzmann equation
LBM  Lattice Boltzmann Method
LGA  Lattice Gas Automatta
MD  Molecular Dynamics