Personal Particulars

Name: Abouzar Kaboudian
Date of Birth: 26 November, 1983

Nationality: Iranian
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Education Qualifications

Jan 2007-Present	M. Eng (Master of Engineering by Research in Mechanical Engineering) School of Mechanical & Aerospace Engineering Nanyang Technological University, Singapore. GPA: 5/5
Sep 2002–Sep 2007	B. Sc (Bachelor of Science in Thermo Fluid Mechanics) School of Mechanical Engineering Isfahan University of Technology, Isfahan, Iran. GPA: 15.85/20 Rank: 2nd Major Average GPA: 13.53 Department Average GPA: 13.77
Sep 1995–Sep 2002	Junior High School, High School Diploma and Pre-University in Mathematics and Physics Allameh Helli Iranian National Organization for Development of Exceptional Talents, Arak, Iran. Junior High School GPA: 18.71/20 High School GPA: 18.74/20 Pre-University GPA: 18.84/20

Honors and Awards

1- 2006, A*Star International Graduate Scholarship Award (IGS)
2- 2006, Top Student of Thermo Fluid Engineering in the School of Mechanical Engineering of IUT and acceptance for M. Sc in IUT without Entrance Examination (as an incentive option just for talented students)
3- 2002, Rank 858 out of 368000 participants in Iran National University Entrance Exam and acceptance for B. Sc in Thermo Fluid Engineering in the School of Mechanical Engineering in IUT.
4- 1996-2002, Acceptance in the Entrance Examination of NODET

Publications

1- ***A. Kaboudian,*** *V. Kulish*, “The Modified Fractional Order Schrödinger Equation With Relativistic Limits ”, Under Preparation.
2- ***A. Kaboudian****, P. Tavallali, V. Kulish,* “ Derivation of The Phase-Lagged Schrödinger Equation from Brownian Motion”, Under Preparation.
3- *P. Tavallali,* ***A. Kaboudian****, V. Kulish*, “ Exact Solution for Phase-Lagged Heat Equation in One Dimensional Domain”, International Journal of Heat and Mass Transfer, Submitted.

Selected Technical Reports

1- *M. J. Mashayekhi*, ***A. Kaboudian***, *N. Rahimi*, “Honeycomb design for low speed wind tunnel”, Hydro- and Aero-Dynamics course, Technical Report, Spring 2005.
2- *M. J. Mashayekhi*, ***A. Kaboudian***, *N. Rahimi*, “Reverse Design of Gear Box of Industrial Radial Drill”, Mechanical Elements Design Course, Technical Report, Spring 2005.
3- ***A. Kaboudian***, “Transient Heat Transfer Through Cascade of Fins on a Semi-Insulated Wall, Comparison of FD Method and Lump Capacitance Method”, Heat Transfer I course, Fall 2004.

Teaching Experience:

Undergraduate Courses	Physics I Physics II Statics Dynamics
Lab Supervision	Study of Fan Performance Using Dimensional Analysis Conduction Heat Transfer
Graduate Courses	Introduction to Linux Operating System for Parallel Computing Course, IUT, Iran.

Skills

Computing and Programming

- Professional Languages: C, C++, Fortran, Matlab, Scilab, Mathematica, Turbo Pascal, Maxima.
- Advance User of Linux/Unix OS
- Parallel Programming using MPI
- Graphical User Interface Design using Tcl/Tk
- Shell Script Programming for Linux
- Advance User of Windows OS
- Adequate Familiarity with Maple, Parallel Matlab, Catia and Fluent.

Languages: English (Fluent), Persian (native), Arabic (Intermediate)

Research Interest for Future Studies

- Computational Fluid Dynamics (CFD)
- Parallel Computing
- Heat and Mass Transfer
- Applied Computational Mathematics
- Computational Quantum Mechanics
- Fractional Calculus and Its Applications in Quantum Mechanics
- Level Set Methods and Applications In CFD

The Graduate Courses Results

Corse Title	Grade
Introduction To Tensor With Applications	A
Advance Engineering Mathematics	A
Image Analysis (Special Topic From Technion[1] Lecturer)	Pass
Surfaces & Colloids (Nanoparticles) (Special Topic From Technion Lecturer)	A+
Cluster And Grid Computing Technologies For Scientific Computing (SMA[2])	A+
Quantum Computations[3]	A

Selected Undergraduate Course Results

Corse Title	**Grade** (out of 20)
B. Sc Theses	20
Hydro- & Aero- Dynamics	19
Fluid Mechanics II	17.7
Heat Transfer I	17.5
Energy Conversion	17.3
Engineering Mathematics	18.5
Calculus II	19

[1] Israel Institute of Technology
[2] Singapore MIT Alliance
[3] Special Course From NIE

Research Experience

A) Phase-lagged Formulation of Quantum Mechanics: Application to Ultra-Fast Processes of Energy and Information Transport (Current Research Topic in NTU)

The Schrödinger equation, the corner stone in quantum mechanics, gives rise to the paradox of instantaneous propagation of energy. The Schrödinger equation is not a relativistic formula. Despite of all the attempts, there is ***no*** unique and general formulation which removes the paradox and gives relativistic results in all cases has been proposed.

Three possible phased-lagged derivations of the Schrödinger equation have been proposed, based on the assumption that there exists a *finite* time lag between the onset of gradients and the corresponding flux. The extended version of the Schrödinger equation, therefore, has been proposed to eliminate the paradox of instantaneous propagation, intrinsic to the classical Schrödinger equation.

Furthermore, based on the theory of fractional calculus a fractional order PDE is proposed to modify the classical Schrödinger equation. The proposed equation has relativistic limits. New concepts such as quantum information wave speed has been proposed to further extend the idea of the Lorentz invariant.

B) Solving Partial Differential Equations Using scilab (B. Sc theses in IUT)

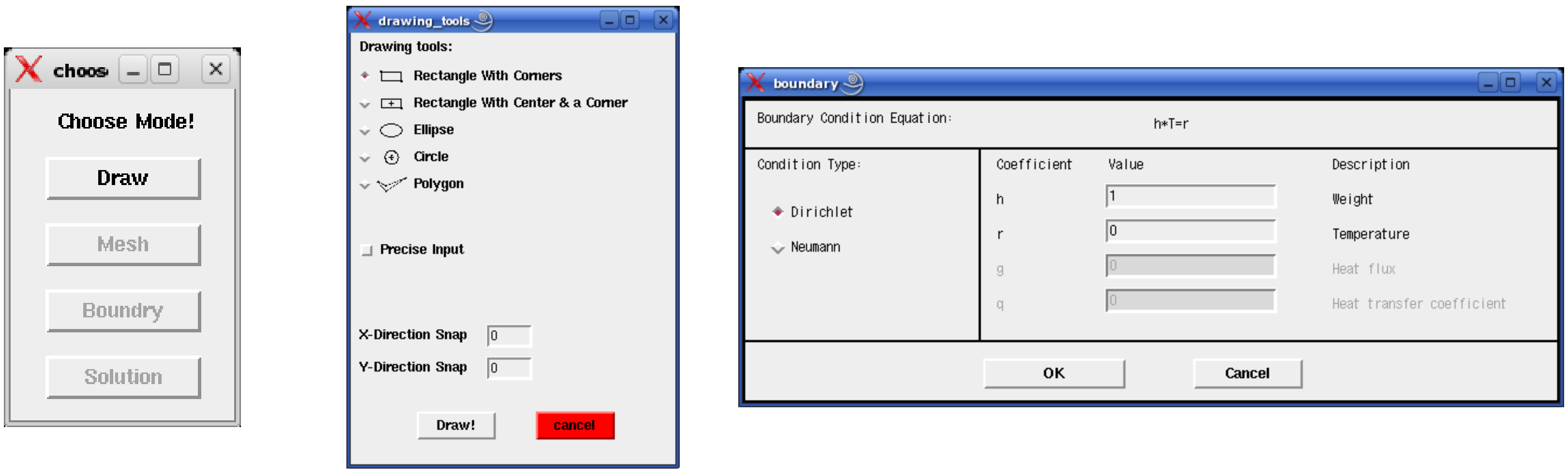
In this project, we tried to solve PDEs, specifically heat equation, using scilab. Scilab is an open source software developed by INREA which has several matrix calculation abilities comparable to MATLAB.

This project consisted of several programming stages:

The first stage was to develop an engine to generate mesh, apply boundary conditions and solve the corresponding PDE. This stage was implemented using the MODULEF which is a library of 3000 procedures written in FORTRAN 77. This part of the engine reads and write all the input-output data to files, so that all the data can be used for future reference and use. It also, performs all the computations to generate mesh, and solve the PDEs.

The second step was to interface the engine with the scilab engine so that the engine can be called inside scilab. This steps consisted of several steps of interfacing and calling either FORTRAN procedures or linux external programs inside scilab.

The third step was to develop a graphical user interface for the toolbox. This graphical user interface was developed using Tcl/Tk programming. The Tcl/Tk programs was later interfaced with scilab to facilitate input-output procedures. In Fig. 1 you can see some sample graphical interface windows of the designed toolbox.



a B c

Fig.1 Three different graphical sample windows of the toolbox: a) main menu b) drawing tools menu c) boundary condition menu

The fourth step was to develop some tools for drawing the geometry or the domain of the solution. This step was done using the graphical properties of scilab. All drawing tools were designed within the scope of the project.

The last stage was developing the post processing tool. In order to do so, post processing facilities and programs were developed using MODULEF library and were interfaced with the scilab engine. In fig. 2 and fig. 3 you can see some of the features and results of solving the heat equation using the toolbox.

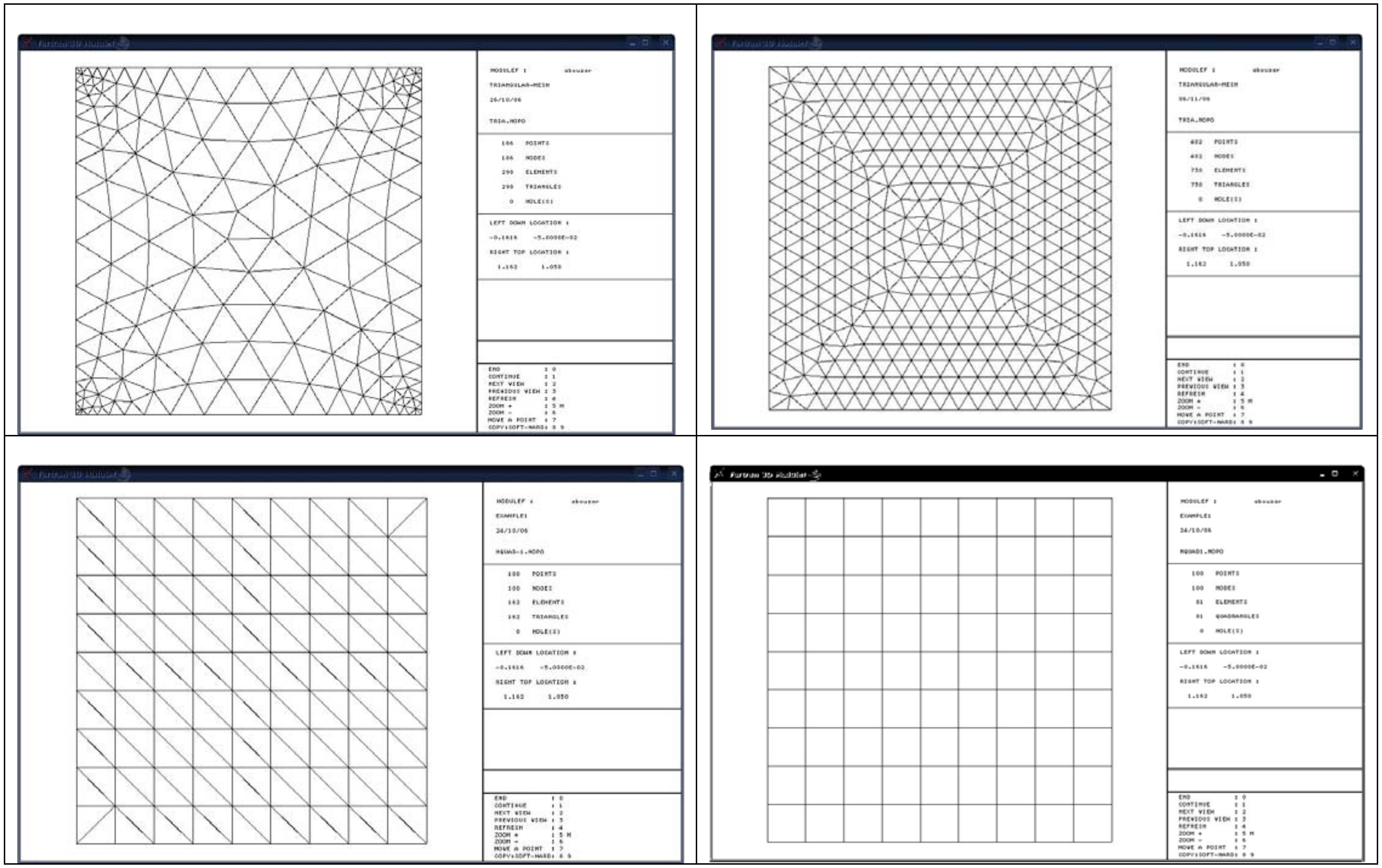


Fig. 2 Different abilities of the PDE-Toolbox to generate irregular and regular meshes

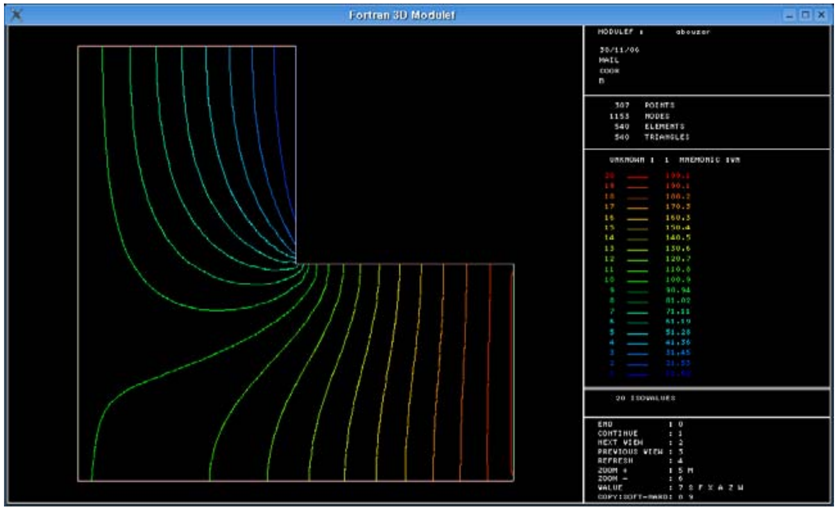


Fig 3 Sample solution of the steady state heat equation on a polygon domain

C) Honeycomb design for low speed wind tunnel in IUT:

Honeycombs are used in wind tunnels, to reduce the longitudinal components of turbulence as well as the lateral components of mean velocity and turbulent eddies. The mode of action of a honeycomb with cells elongated in the flow direction, is qualitatively clear but few tests have actually been made, and all that is certain is that the cell length of the honeycomb should be at least six or eight times the cell diameter. Stacking two honeycombs together to get a larger effective length-to-diameter ratio is acceptable if the two are tightly laced together.

In this project, a honeycomb cell size and length had to be designed such that it meets both research and educational requirements in a economical and practical way. Deciding between a honeycomb with large longitudinal length and two honeycombs of smaller size was crucial, as two honeycombs can produce turbulence but would be much more economical.