Sunil Kumar Omar

30, Petersenstrasse FG-Energie und Kraftwerkstechnik	Phone: +49-6151-16 2533 Fax: +49-6151-166555 Mobile: +49-179-9420509
FB-Maschinenbau TU-Darmstadt Darmstadt, Germany 64287	E-mail: **omar@ekt.tu-darmstadt.de** URL: www.tu-darmstadt.de/fb/mb/ekt/people/omar.html

EDUCATION

PhD in Mechanical Engineering **Aug'00 - Till Date**
Institute for Energy and Powerplant Technology
Technical University of Darmstadt, Germany

Current Research: Application of laser diagnostics [LIF] in turbulent combustion

¥Investigation of Scalars in Turbulent Flames via PLIF
** Reaction Zone imaging via [CH_20] [OH] PLIF in Turbulent flames*
Investigation of Opposed jet flames Qualitative via [OH] PLIF and Quantitative via [OH] PITLIF ! (Purdue University)

¥ Planar Laser Induced Fluorescence Technique
! Pico-second Time Resolved Laser Induced Fluorescence
***** Ongoing measurement

MAIN OBJECTIVE ACCOMPLISHED (PhD) :

1. **Experimental investigation of flame characteristics in turbulent flames via [OH] - PLIF**
2. **Two-dimensional imaging of reaction-rate in turbulent flames via simultaneous PLIF measurements**
3. **Experimental investigation of turbulence-chemistry interaction in turbulent counter-flow flames via [OH]-PLIF**
4. **Building the experimental data bank for turbulent counter-flow burner for future numerical model validation**

M-Tech in Aerospace Engineering **Aug'98 - Jan'00**
Department of Aerospace Engineering IIT-Madras, India **C.G.P.A: 7.89 /10**
Credits earned: 54

***Major Course Credited*:**
First Semester

Transonic Aerodynamics	Introduction to Aerospace Technology
Numerical Analysis	Computers in Engineering
LAB - I [Fluid Mechanics]	LAB - II [Gas Dynamics]

Second Semester

Rocket Technology	Experimental Engineering in Aerospace Gas Dynamics
Convection & Two phase flow	Air Breathing Engines

Third Semester
Project: "*Effect of Acoustic Oscillations on Burning Rate of Rocket Propellant* "

M-Tech Thesis: Development of an experimental Set-up for the combustion of solid propellant under high pressure oscillatory condition

MAIN OBJECTIVE ACCOMPLISHED IN THESIS (M-Tech) :

1. **To design, construct and install a high pressure combustion cell for experimentation of burning rate of solid rocket propellant over a wide pressure range**

2. **To test the solid propellant for its burning rate as a function of mean pressure under quiescent and oscillatory condition**

3. **To test the rotary value developed previously for operation under high pressure conditions and variable acoustic modes**

4. **To establish a high-pressure testing facility and a corresponding data reduction procedure involving vedio images**

5. **To for mulate an ammonium perchlorate based composite solid properllant with composition closely resembling commercial formulations**

B. E. (The Aeronautical Society of India- New Delhi) **Jun'95 - J un'98**
A.M.Ae.S.I [New-Delhi] India **Score: 62 %**

Higher Secondary School Examination **April'94- April'95**
M.P Board of Education India **Score: 67.3 %**

WORK EXPERIENCE

Project Associate in Department of Aerospace Engineering at IIT-Madras
Jan'00 - Aug'00
Topic: Erosive Burning Rate Characteris tics of Nozzleless Booster Propellants

Teaching Assistance in Department of Aerospace Engineering at IIT-Madras
Jan'99 - Dec'99
Lab-work for undergraduate students [Rocket and Missile Lab]

Worked as a part-time lecturer for undergraduate students of Aeronautical Society of India at Ganesh Institute of Technology [Madras]
Subject Taught: Rocket Propulsion [Propulsion-III]

PROJECTS UNDERTAKEN

PhD:

- Investigation of Flame Characteristics in Turbulent Flames via PLIF Technique
- Investigation of [OH] time-series via PITLIF technique [Purdue University, U.S.A]

M-Tech:

- Effect of Acoustic Oscillations on Buming Rate of Rocket Propellant
- Erosive Burning Rate Characteristics of Nozzleless Booster Propellants

COMPUTER SKILLS

Languages: C, Basic

Operating Systems: Windows NT/XP/2000/98/95, MS DOS

Engineering Tools: MATLAB (Image Processing), MathCAD, Autocad, Labview(Basic)

Other Software: LaTEX, MS Office 2000

Internet Related: HTML, Web Development

TECHNICAL PAPER'S

1) Omar, S. K., Geyer, D., Dreizler, A., Janicka, J. (2004)," **Investigation of flame structures in turbulent partially premixed counter-flow flames using planar laser-induced fluorescence.",** *Journal for Progress in Computational Fluid Dynamics,* Vol 4, Nos. 3-5, pp.241-249.

2) D. Geyer, S. K. Omar, A. Nauert, A. Ludwig, A. Dreizler and J. Janicka. (2002),“ **) A comprehensive characterization of a turbulent opposed jet flame by 1D-Raman / Reyleigh, 2D LIF and LDV.”,** 1st International SFB 568 – Workshop, Darmstadt Germany (2002).

3) Sunil Kumar Omar, N. Prakasham, B. Karthik, T. Ponnurangam, S. R. Chakravarthy and R. I. Sujith, “**Effect of Acoustic Oscillation on Propellant Burning Rate**”, Published at the 3rd International high energy materials conference and exhibit, Thiruvananthapuram, INDIA DECEMBER 6-8 (2000).

POSTER

1) Hydroxyl time-series measurements in counter-flow partially premixed CH_4 /AIR flames. Presented in Gordon Conference at Oxford (Aug 2003).

2) Investigation of flame structures and OH time series in turbulent partially premixed counter-flow flames. Presented in SFB-568 Gutachtung (SFB-568 review) (July 2003).

3) Investigation of turbulent partially premixed flames stabilized in an opposed jet geometry using OH-PLIF. Presented in 29th Combustion Symposium at Sapporo, Japan (21st -26th July 2002).

TECHNICAL VISIT

- **Visited at VIKRAM SARABHAI SPACE CENTRE of the Indian Space Research Organization (INDIA).**
- **Visited to Purdue University (USA) for PITLIF measurements in Opposed Jet flames.**

REFERENCES

- Prof. Dr. J. Janicka, Professor, Department of Energy and Power plant Technology, Technical University of Darmstadt. [GERMANY]
  Ph: +1 713 743 4318, Email: **janicka@ekt.tu-darmstadt.de**

- Dr. Andreas Dreizler, Associate Professor, Department of Energy and Power plant Technology, Technical University of Darmstadt. [GERMANY]
  Ph: +1 713 743 4318, Email: **dreizler@ekt.tu-darmstadt.de**

- Dr. S.C.R.Chakravarthy, Associate Professor, Department of Aerospace Engineering, Indian Institute of Technology, Madras. [INDIA]
  Ph: +91 44 4459226, Email: **satya@ae.iitm.ac.in**

- Dr. R.I.Sujith, Associate Professor, Department of Aerospace Engineering, Indian Institute of Technology, Madras. [INDIA]
  Ph: +91 44 4459226, Email: **sujith@ae.iitm.ac.in**