SHREYAS KOTIAN

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EDUCATION

Cornell University, Ithaca, NY, USA *Aug 2021- May 2023*
M.S in Mechanical Engineering **(GPA: 3.84/4.0)**

- **Research Advisor**: ***Prof. Thomas Avedisian***
- Awarded the **J.N. TATA Scholarship** for 2021-2023.
- Selected for **Princeton-Combustion Institute Summer School on Combustion**.
- **Reviewer** for **Results in Engineering**, **Journal of Thermal Engineering**.
- **Grader** for Thermodynamics under **Prof. Elizabeth Fisher**.

K.J. Somaiya College of Engineering, Mumbai, India *2017-2021*
B. Tech in Mechanical Engineering **(GPA: 9.21/10)**

- Awarded **AP Grade** for exceptional performance in **Applied Mathematics, Heat and Mass Transfer and Heat and Mass Transfer Lab, Machine Design-II, Energy Conversion-II, and Design of Heat Exchangers**
- Ranked **1st** among **155** students for **Applied Mathematics** in the department in 2019.

PUBLICATIONS

- **"Methodology of Conceptual Design of HALE UAV for Coastal Surveying"**, **S. Kotian**, R. Gupta, T. Prakash, and R. Pant, ***AIAA Aviation 2022 Forum***, 2022.
- **"Hemodynamic characteristics in a straight and wavy artery: A numerical study"**, **S. Kotian**, S. Nikam, N. Methekar, and N. Jain, *Proceedings of the 48th National Conference on Fluid Mechanics and Fluid Power,* 2021 (Accepted).
- **"Turbulent characteristics of compressible jet from a chevron nozzle: A numerical study"**, **S. Kotian**, N. Jain, N. Methekar, and S. Nikam, *Proceedings of the 48th National Conference on Fluid Mechanics and Fluid Power*, 2021 (Accepted).
- **"Theoretical Investigation of Thermohydraulic Characteristics of a Shell and Tube Heat Exchanger", S. Kotian**, N. Methekar, N. Jain, P. Vartak, P. Naik, and S. Bhusnoor, ***Proceedings of the 26th National and 4th International ISHMT-ASTFE Heat and Mass Transfer Conference***, 2021.
- **"Numerical Investigation of Thermohydraulic Characteristics of a Gasketed Plate Heat Exchanger",** N. Methekar, **S. Kotian**, N. Jain, P. Vartak, P. Naik, S. Nikam, and S. Bhusnoor, ***Computational Thermal Sciences: An International Journal***, 2021.
- **"Numerical Investigation of thermo-hydraulic performance of shell and tube heat exchanger using vortex generators"**, N. Jain, **S. Kotian**, and S. Nikam, *Journal of Thermal Engineering,* 2021 (Accepted)
- "**Colburn vs Bell Delaware approach for evaluation of thermohydraulic performance of shell and tube heat exchanger: A theoretical study"**, **S. Kotian**, N. Methekar, N. Jain, P. Vartak, and P. Naik, ***Materials Today: Proceedings***, 2021.
- "**Numerical Investigation of Baffle Orientation on Recirculation zones in a Shell and Tube Heat Exchanger,**" **S. Kotian**, N. Jain, and S. Nikam, ***AIP Conference Proceedings***, 2021.

RESEARCH EXPERIENCE

Experimental Investigation of Ignition of Fuel Droplets at Elevated Pressures Cornell University
Prof. C Thomas Avedisian *Jan 2022- Present*

- The first part governs ignition of fuel droplets at elevated pressures for petroleum-based and biofuels. Experiments are further divided into normal gravity and zero gravity cases. Characteristics such as soot, soot shell, flame, droplet, and incandescence are examined using high speed cameras also.
- The second part of the study concerns with the ignition method of fuels. One is using spark electrodes and the other is by placing heated coils in close proximity.
- Current study will investigate the range of variables for ignition including energy and duration to the ignition system and geometrical proximities of the energy source to the droplets and oxidizer concentration in the high-pressure chamber where actual ignition occurs.

Comparison of Aerodynamic Characteristics of a Golf Ball and a Ping Pong Ball using PIV Imaging Cornell University
Prof. Edwin (Todd) Cowen *Sep 2021- Dec 2021*

- Goal of the present study is to investigate how the dimples on golf balls help in reducing drag as compared to a ball with no depressions on it. PIV technique was used for the same.
- Particles were added to the flow of water so that they can be traced and the aerodynamic characteristics can be evaluated. An Argon-ion laser light was shot to illuminate the particles and then processed through a MATLAB program to evaluate movement between image pairs.
- A total of 1500 image pairs were taken over a span of 2 minutes. By the conservation of momentum, the drag coefficient of drag acting on the objects was the ratio of drag force to dynamic pressure.
- The golf ball and the ping pong ball were studied in a flow corresponding to approximately 1 m/s, Re = 30,000. It was found that the C_d value for the ping pong ball turned out to be 0.877 which is higher than the C_d value for the golf ball which was 0.795.

Conceptual Design of a HALE UAV for Coastal Surveying IIT Bombay
Prof. Rajkumar Pant *Jan 2021- Nov 2021*

- In recent years, UAV's and drones have been proposed to monitor weather conditions, coastal areas, topography of beaches, movement of shallow waters etc., due to their adaptability and versatility. The current study proposes the conceptual design of a HALE UAV for coastal surveying if the Indian subcontinent.

- The conceptual design stage is divided into four different stages, namely the drag estimation, initial sizing, constraint analysis, and wing and tail mass estimation. The proposed UAV is meant to monitor the entire length of the Indian subcontinent which is 3800 km. The survey is a 24-hr. mission which can be repeated as per requirement.
- A LiDAR and multi-spectral camera on board are used to collect data. The UAV flies at an altitude of 65,000 ft so as to not be interrupted by civilian traffic and also for the payloads to cover large areas on the ground.
- To test, the accuracy of our given UAV model, it was validated against the Northrop Grumman Global Hawk RQ-4A. Parameters such as zero-lift drag coefficient, maximum take-off weight, constraint analysis, and wing and tail mass were estimated and they were in good agreement.

Hemodynamic characteristics in straight and wavy arteries KJSCE
Prof. Shailesh Nikam *Jan 2021- May 2021*

- Hemodynamic characteristics in straight and wavy arteries were numerically investigate using ANSYS Fluent. Analysis was done both for steady and unsteady flow.
- The straight and wavy arteries were again subdivided into plain arteries and arteries with bifurcations. It is important to study hemodynamic characteristics which helps in the early identification of various ailments such as plaque formation.
- It was also found that if waviness of the arteries increases with age, there are chances of reducing wall shear stress especially at the crest and trough of the blood vessel.

Computational Analysis of Turbulent Characteristics from a Chevron Nozzle KJSCE
Prof. Shailesh Nikam *Jan 2021- May 2021*

- Jet-noise has been a serious concern over the years and attempts have been made to reduce it using devices such as tabs, vortex generators, notches, chevrons, and microjets. Present study investigates turbulent characteristics from a chevron nozzle with a crest angle of 45° were studied for an exit Mach number of 0.8.
- Presence of chevrons reduces turbulence which is the cause of jet noise by the enhanced mixing between the two fluids which is aided by the formation of counterrotating vortices. When compared to the baseline nozzle, no streamwise vortices were observed in that case.

Heat Transfer Augmentation using Vortex Generators in a Shell and Tube Heat Exchanger KJSCE
Prof. Shailesh Nikam *Sep 2020- Dec 2020*

- The purpose of this study was to use vortex generators as a passive device in the baffle window to observe its effect on the recirculation zones present in a shell and tube heat exchanger. Vortex generators with different orientations- 30°, 45°, 60°, and 75° and their effect on the thermo-hydraulic performance of the heat exchanger was investigated.
- It was observed that the wedge with an angle of 75° gave the best thermal performance with an augmentation in heat transfer rate by about 11.30% but pressure drop was a penalty.

Internship Studio| *Summer Research Intern* *Jun 2020- Aug 2020*

- Observed the operation of an ice manufacturing plant to evaluate energy consumption per ton, cooling load and refrigeration load of the chiller.
- Suggested strategies for efficient energy consumption such as the use of pre-chilled water through cooling towers instead of air- cooled chillers.

Numerical Analysis of a Gasketed Plate Heat Exchanger KJSCE
Prof. Shailesh Nikam *Feb 2020- Apr 2020*

- The following study was divided into three parts- determining a heat transfer correlation for a particular chevron angle of the heat exchanger, comparing heat transfer rates between a gasketed plate heat exchanger and a flat plate for the same heat transfer area, and effect of chevron angle on the heat transfer coefficient.
- It was concluded that numerous correlations have been developed to determine heat transfer coefficient but no one particular can be used universally. A corrugated plate has better thermal performance than a flat plate and the heat transfer rate increases with increase in chevron angle of the heat exchanger.

PROFESSIONAL EXPERIENCE

CueMath Teacher Partner, Mumbai, India |*Teacher* *Sep 2020 – Dec 2020*

- Tutoring students based at the US for Mathematics. Facilitating student interaction, strong basics and application.
- Preparing and presenting lessons in a comprehensive manner through the e-learning platform.

Learning Curve- My Personal Tutor, Mumbai, India |*Teaching Assistant* *Sep 2020 – Nov 2020*

- Tutoring students for Mathematics and Physics, helping them realize the essence of the subject and its application.
- Mentoring and motivating students master subjects by conceptual clarity and practical application instead of rote learning.

TECHNICAL SKILLS

- Programming Languages: Visual Basic, C Programming, SQL, MATLAB, Math Type, Latex, HTML.
- Software: Solidworks, AutoCAD, ANSYS Workbench, ANSYS Fluent.

EXTRA CURRICULAR ACTIVITIES

- Winner of **Division I of Eastern Collegiate Badminton Championships** *2021,2022*
- Ranked **38th** in **All India National Engineering Olympiad** *2020*
- Ranked **7th** in **All India National Creativity Aptitude Test** *2020*
- Stood among **Top 1%** in the **National Standard Examination in Physics** among **44,032** candidates *2016*
- Selected as the **Captain** of **College Badminton Team** (**Won 12 tournaments**) and **National Level Badminton Player**. **National Level Handball Player** and **3-time State Champion** in **Shotput** and **Discus Throw**, *2011-16*