

# DR. ANUP PAUL

## ASSISTANT PROFESSOR, MECHANICAL ENGINEERING

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Department of Mechanical  
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NIT Arunachal Pradesh,  
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### Research Areas:

Biological heat and mass transfer, Thermal management, Renewable energy.

### EDUCATION

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<b>Ph.D.</b>	IIT Madras	2015
<b>M.Tech.</b>	BPUT, Rourkela	2008
<b>B.Tech.</b>	NERIST	2005

### RESEARCH

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My research group (which currently consists of 2 Ph.D. scholars and 2 M.Tech students) is in general inclined towards the following:

- Understanding the tissue-thermal behavior under the influence of different external sources such as Laser, Microwave, Ultrasound etc.
- Experimental and numerical study of microwave heating of nanofluids.
- Two phase modeling of nanofluid flow in non-conventional micro-channel systems.
- Thermo-hydro dynamics of droplet impacts.

### EXPERIENCE

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- Assistant Professor, Grade I- NIT Arunachal Pradesh (June'2019 to Till date)
- Assistant Professor, Grade II- NIT Arunachal Pradesh (Dec'2015 to June'2019)
- Assistant Professor – Tezpur University (May'2015 to Dec'2015)

## TEACHING EXPERIENCE

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### Courses Taught

1. Thermodynamics (UG), Tezpur University, NIT Arunachal Pradesh
2. Applied Thermodynamics (UG), NIT Arunachal Pradesh
3. Advanced Heat Transfer (UG), Tezpur University.
4. Design of Refrigeration & Air Conditioning (PG), NIT Arunachal Pradesh.
5. Refrigeration & Air Conditioning (UG), NIT Arunachal Pradesh.
6. Heat Transfer (UG), NIT Arunachal Pradesh
7. Research Methodology & Experimental Methods (PG), NIT Arunachal Pradesh
8. Basic Elements of Mechanical Engineering (UG), NIT Arunachal Pradesh
9. Creative Design (UG), NIT Arunachal Pradesh
10. Conduction and Radiation (PG), NIT Arunachal Pradesh
11. Convective Heat Transfer (PG), NIT Arunachal Pradesh

## AWARDS/ACHIEVEMENTS

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- MHRD fellowship during PhD at IIT Madras, 2010
- Early Career Research Award, SERB(DST), 2017

## PUBLICATIONS

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### Journal Publications

2020

1. **Abhijit Paul, Anup Paul** "In-Vitro Thermal Assessment of Vascularized Tissue Phantom in Presence of Gold Nanorods During Photo-Thermal Therapy", Journal of Heat Transfer, Transac. of the ASME, (IF: 1.787), vol. 142 , issue 10, pp. 101201-1-101201-14, 2020. (<https://doi.org/10.1115/1.4047371>)
2. **Abhijit Paul, Anup Paul** "Thermomechanical Analysis of a Triple Layered Skin Structure in Presence of Nanoparticles Embedding Multi-level Blood Vessels", International Journal of Heat and Mass Transfer, Elsevier, (IF: 4.947), vol. 148 , issue 119076, 2020. (<https://doi.org/10.1016/j.ijheatmasstransfer.2019.119076>)
3. **Gajendra Singh, Abhijit Paul, Himanshu Shekhar, Anup Paul** "Pulsed ultrasound assisted thermo-therapy for subsurface tumor ablation: a numerical

investigation", J of Therm. Sci. and Engg. Appl., Transac. of the ASME, (IF: 1.544) (Accepted), 2020.

4. **Dhiraj Kumar, Purbarun Dhar, Anup Paul** "Thermal Response of Dielectric Nanoparticle Infused Tissue Phantoms during Microwave Assisted Hyperthermia", arXiv preprint arXiv:2006.13568, , 2020. ([arXiv preprint arXiv:2006.13568](https://arxiv.org/abs/2006.13568))
5. **Abhijit Paul, Anup Paul** "Thermomechanical Assessment of Breast Tumor Subjected to Focused Ultrasound and Interstitial Laser Heating", arXiv:2007.14053, , 2020. ([arXiv:2007.14053](https://arxiv.org/abs/2007.14053))

## 2018

1. **Abhijit Paul, Anup Paul** "Computational Study of Photo-thermal Ablation of Large Blood Vessel Embedded Tumor using Localized Injection of Gold Nanoshells.", Journal of Thermal Biology, Elsevier, (IF: 2.361)., vol. 78, pp. 329-342, 2018. (<https://doi.org/10.1016/j.jtherbio.2018.10.021>)

## 2016

1. **Anup Paul, Purbarun Dhar, Arunn Narasimhan, Sarit K Das** "Analytical prediction of sub-surface thermal history in translucent tissue phantoms during plasmonic photo-thermotherapy", Journal of Thermal Biology, (62, part B) Elsevier, (IF: 2.361)., vol. 62, part B, pp. 143-149, 2016. (<https://doi.org/10.1016/j.jtherbio.2016.06.023>)
2. **Anup Paul, Arunn Narasimhan, Sarit K Das, Soujit Sengupta, T Pradeep** "Subsurface Thermal Behavior of Tissue Mimics Embedded with Large Blood Vessels During Plasmonic Photo-thermal Therapy (PPTT).", International Journal of Hyperthermia,, Taylor Francis. (IF: 3.574)., vol. 32 , issue 7, pp. 765-777, 2016. (<https://doi.org/10.1080/02656736.2016.1196831>)
3. **Anup Paul, Arunn Narasimhan, Sarit K Das** "Investigation of thermal damage of tissues embedded with large blood vessels during Plasmonic Photo-thermal Heating (PPTH)", Int. J. Num. Meth. Heat and Fluid flow,, Emerald. (IF: 1.713)., vol. 26(2), pp. 461-476, 2016.

## 2014

1. **Anup Paul, Arunn Narasimhan, Franz J. Kahlen, Sarit K Das** "Temperature Evolution in Tissues Embedded with Large Blood Vessels During Photo-thermal Heating", Journal of Thermal Biology, Elsevier,(IF:

2.361), vol. 41, pp. 77-87, 2014. (<https://doi.org/10.1016/j.jtherbio.2014.02.010>)

2. **Anup Paul, Nanda Kishor Bandaru, Arunn Narasimhan, Sarit K Das** "Subsurface Tumor Ablation with Near infrared Radiation Using Intratumoral and Intravenous Injection of Nanoparticles", Int. J. Micro-Nano Scale Transport, Multiscience, USA., vol. 5, pp. 69-80, 2014.

### Conference Proceedings

#### 2018

1. **Abhijit Paul, Anup Paul** "Investigation of Nanoparticle Infused Tumor Necrosis Embedding Large Blood Vessels During Hyperthermia Treatment", ThermaComp2018, 2018, 2305-6924.
2. **Atisha Chhajed, Anup Paul** "Investigation of geometrical parameters on hydrodynamic performance within U type wavy microchannel system", ICAST-2018, 2018.

#### 2014

1. **Anup Paul, Nanada Kishor Bhandaru, Arunn Narasimhan, Sarit K Das** "Tumor Ablation with Near-Infrared Radiation using Localized Injection of Nanoparticles", begell house, IHTC-15, 2014, 1615/IHTC15.bma.009715.
2. **Anup Paul, Arunn Narasimhan, Sarit K Das** "Study of thermal damage of tissues embedded with large blood vessels during photo-thermal heating", 3rd International Conference on Computational Methods for Thermal Problems, 2014, 2305-5995.

#### 2013

1. **Anup Paul, Arunn Narasimhan, Sarit K. Das** "Steady temperature distribution of tissue embedded with large blood vessels during photo-thermal therapy,(HMTTC1300070).", Proceedings of the ISHMT-ASME Heat and Mass Transfer Conference, 2013.

## **RESEARCH PROJECTS**

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- 1. Study of interaction between liquid droplet and solid surfaces with variant wettability.**

**Funding Agency :** TEQIP-III

**Principal Investigator :** Dr. Anup Paul

**Starting Year :** 2019-2020

**Funding Amount :** 2 Lakhs

**Status:** Ongoing

- 2. Numerical and Experimental investigation of effect of thermally significant? blood vessels during laser assisted thermal therapy**

**Funding Agency :** SERB, DST(GoI)

**Principal Investigator :** Dr. Anup Paul

**Starting Year :** 2017-2020

**Funding Amount :** 30 lakhs

**Status:** Completed