rajmea news

Department of Mechanical Engineering

RVR & JC College of Engineering, GUNTUR - 522 019

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CAD at Nano Scale

The time has come for engineers to be able to customize their material exactly to the piece they're designing.

As the advent of flexible electronics attests, the materials with which things are made are at the root of today's product innovations.

The Georgia Institute of Technology's Multiscale Systems Engineering Research Group, where I'm a faculty member, is working to integrate the modeling and simulation features of today's CAD with materials design capability. These integrated features would be available at the nano, meso, micro, and macro scales, which we call multiscale CAD.

Integration would allow engineers to create customized materials (that is, materials that contain pores or voids, or super alloys that have coexisting phases) to meet their needs while performing structural and shape design at the macro scale.

Similar to the conventional CAD as the first tool for virtual prototyping, the primary function of multiscale CAD is to allow the efficient construction and interactive modification of geometric models for microstructures. Existing boundary-representation-based parametric modeling approaches have become inefficient in model construction at nano and meso scales where geometry and topology are highly complex. New modeling and representation techniques are thus needed and this is the goal of our research.

In future CAD systems, engineers will be able to zoom in to specify material morphology and distributions. They'll be able to combine material design at the nano or micro scales, with geometrical and topological design at the macro scale to optimize the product's performance.

Contents.....

Look Well to This Day

By Kalidasa, Indian Poet, Fifth Century A.D.

Look well to this day,
For it and it alone is life.
In its brief course
Lie all the essence of your existence:

The Glory of Growth
The Satisfaction of Achievement
The Splendor of Beauty

For yesterday is but a dream,
And tomorrow is but a vision.
But today well lived makes every
yesterday a dream of happiness,
And every tomorrow a vision of hope.

The Serenity Prayer

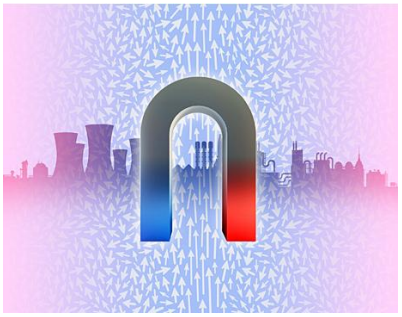
By Reinhold Neibuhr

God grant that I might have
The courage to change the things I can,
The serenity to accept the things I cannot,
And the wisdom to know the difference

10 Tips To Recharge Your Creativity

1) Exercise
2) Hit up the local coffee shop
3) Try a new genre
4) Seek out a mentor … or an apprentice
5) Add something new to your repertoire
6) Share your work with someone new
7) If you're a musician read, if you're a writer listen to music
8) Break your routine
9) Go to a show, art gallery, etc.
10) Find a new form of art

Magnetic Nanofluid Improves Cooling



Most cooling systems remove excess heat by using water pumped through pipes. Some pipes are designed to include fins or grooves on the pipe surfaces to increase surface area for greater heat transfer, but these design features increase manufacturing costs. Water can also be pumped through the system at a faster speed to enhance heat transfer, but drawbacks include higher energy costs and a greater pressure drop in the system.

To find a better way to reduce heat in cooling systems, especially for nuclear power facilities, researchers at the Massachusetts Institute of Technology (MIT) investigated how magnetic nanofluids affect heat-transfer rates in a flowing system.

In a recent paper in the *International Journal of Heat and Mass Transfer*, Lin-Wen Hu, associate director of MIT's Nuclear Reactor Laboratory, Jacopo Buongiorno, associate professor of nuclear science and engineering at MIT, Reza Azizian, postdoctoral associate at MIT, and others described a successful experiment where they demonstrated heat transfer coefficients of magnetite nanofluids were increased up to 300% when a local magnetic field was applied. These impressive results indicate this type of approach could be a highly effective, low-cost way to eliminate hotspots in cooling pipes, which can sometimes lead to system failures.

Experimental Design

Magnetite nanofluids consist of colloidal magnetite nanoparticles suspended in a base fluid. The main interest in using nanofluids in thermal engineering systems is that their enhanced thermophysical properties (such as thermal conductivity), relative to the base fluid, can improve thermal management in the system. In a typical nanofluid, the nanoparticles are uniformly dispersed. In a solution of magnetic nanoparticles, however, the particles can be controlled using an external magnetic field, which enhances their thermal conductivity.

"In absence of an external magnetic field, the heat transfer characteristics of the flowing magnetite nanofluid can be predicted by classical correlations," says Azizian. "We wanted to know if an external magnetic field could be exploited to increase heat transfer in flowing systems."

The experimental setup consisted of a closed-loop flow system equipped with a pump, flow meter, heat exchanger, thermocouples, and pressure transducer. The test section in the flow system was fabricated from stainless steel tube. Eleven K-type thermocouples were evenly distributed and connected to the outer wall of the tubing along the test section. A constant heat flux was provided across the test section, which was well insulated to minimize heat loss. The fluid (either de-ionized water or nanofluid) was pumped through the system and heated up by a constant heat flux as it passed through the test section. The fluid then returned to an accumulator, where a heat exchanger maintained the fluid at a constant temperature. NdFeB, grade 42 block permanent magnets were used to generate magnetic fields along the test section.Measurements showed that the local heat transfer coefficient of magnetite nanofluids increased up to 300% when a magnetic field was applied locally. The amount of increase was found to be a function of flow rate, magnetic field strength, and gradient.Hu indicates the magnets "attract the particles closer to the heated surface of the tube, greatly enhancing the transfer of heat from the fluid. Without the magnets in place, the low-concentration magnetite nanofluid behaves just like water, with no change in its cooling properties."

Staff Corner

Research Papers Published in Seminars/Conferences/Workshops(with ISBN no):

- **Srinivas Chandana**, Ramji K and Naveen Ravella,"*Simulation based Layout Design of single and m ulti row Flexible Manufacturing Systems* ", ISCI-2012 (International Simulation Conference of India), organized by IIT Bombay during 2-4 February 2012 Paper.no:29.
- Venkata Siva S B, **Dr. G. Srinivasarao**, Dr. K. L. Sahoo, S.K.Singh, Dash R.R. and GAnguly R.I, *"Development of Aluminium Metal Matrix Composite by using Colliery Shale : A waste product from indian coal mines ceramic composites"* Accepted for the Publication in the Proceedings of Internat*ional Conference on Powder Metallurgy and Particulate Materilas,* Nash Ville, Tennessee, USA, 10 - 13th June. 2012.
- M.Gopi Krishna, **K.Praveen Kumar** , K.K.Kishore , N.R.M.R. Bhargava , J.Babu Rao , *"Fabrication and characterization of A356/CuMgAl$_2$ Composites"* , National Conference on Advances in Materials in Engineering(MATERIAUX-2K12) , organized by Department of Metallurgical Engineering , Andhra University , Visakhapatnam during 24-25th Feb 2012. PP :11
- Venkata Siva S B, **Dr. G. Srinivasarao**, Dr. K. L. Sahoo, Amit Chatterjee and Anupam Paul "Development of Aluminium Metal Matrix Composite by using an in-situ ceramic composites" Published in the Proceedings of N*ational Conference on advances in Materials Engineering*(MATERIAUX-2K12), AU College of Engg. Andhra University, Visakhapatnam, 24 - 25th Feb. 2012, pp. 13.
- **K.Praveen Kumar** , M.Gopi Krishna, K.K.Kishore , N.R.M.R. Bhargava , J.Babu Rao , *"Fabrication and characterization of AA2024/Al-20%Cu-10%Mg Composites"* , National Conference on Advances in Materials in Engineering(MATERIAUX-2K12) , organized by Department of Metallurgical Engineering , Andhra University , Visakhapatnam during 24-25th Feb 2012. PP :27
- K.K.Kishore, **K.Praveen Kumar** , M.Gopi Krishna, , N.R.M.R. Bhargava , J.Babu Rao , *"Studies on Machinability properties of Aluminium Composites"* , National Conference on Advances in Materials in Engineering(MATERIAUX-2K12) , organized by Department of Metallurgical Engineering , Andhra University , Visakhapatnam during 24-25th Feb 2012. PP :33

Department Activities

Guest Lectures Delivered by the Faculty :

Dr. V. Chiitaranjan Das , Professor , has delivered a guest lecture on "Micro Machining" during a National Level seminar on Advances in Design & Manufacturing Automation organized by Department of Mechanical Engineering ,DMS SVH College of Engineering , Machilipatnam on 24th February 2012.

Guest Lectures organized by the Department :

" Opportunities for Mechanical Engineers" by Sri. K.V. Subbarayudu , Dy. Chief Materials Manager , Sc. Railway , Secunderabad on 03rd march 2012.

Higher Degree Awarded :

Ø Sri G.Chaitanya , Lecturer , has been Awarded Doctor of Philosophy from J.N.T University , Hyderabad for his thesis entitled " Multi objective optimization of axial flow compressors using Genetic Algorithms" in May 2012.

Student Corner

Results Analysis :

	Total Appeared	Total Passed	Pass percentage
II / IV I sem	137	97	70.8
III /IV I sem	125	106	84.8
IV/IV I sem	135	110	81.48
III /IV II sem	124	92	74.19
IV/IV II sem	137	135	98.54

GATE -2011 Results :

Number of Students qualified	Highest all India Rank
5	2369

- First Engineering College in Andhra Pradesh Accredited (All Programmes) for FOUR Times by NBA

Management members, Principal, Deans and Heads of the Departments with the NBA Expert Team

- RVRJC College of Engineering Receiving The Best Laboratory Award among the Acharya Nagarjuna University Engineering Colleges.

Dr. A. Sudhakar, Principal, Receiving the Best Performing Professional College Award from Dr. K. Viyanna Rao, Vice Chancellor and Dr. R.R.L. Kantam, Registrar, Acharya Nagarjuna University, Guntur

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