SciTech

Forging High-Tech Armor From Shock-Dissipating

Additively manufactured fractal structures with closely spaced voids dissipate shockwaves five times better than solid cubes.

Tiny, 3D printed cubes of plastic, with intricate fractal voids built into them, have proven to be effective at dissipating shockwaves, potentially leading to new types of lightweight armor and structural materials effective against explosions and impacts.

“The goal of the work is to manipulate the wave interactions resulting from a shockwave,” said Dana Dattelbaum, a scientist at Los Alamos National Laboratory and lead author on a paper to appear in the journal AIP Advances. “The guiding principles for how to do so have not been well defined, certainly less so compared to mechanical deformation of additively manufactured materials. We’re defining those principles, due to advanced, mesoscale manufacturing and design.”

Shockwave dispersing materials that take advantage of voids have been developed in the past, but they typically involved random distributions discovered through trial and error. Others have used layers to reverberate shock and release waves. Precisely controlling the location of holes in a material allows the researchers to design, model, and test structures that perform as designed, in a reproducible way.

The researchers tested their fractal structures by firing an impactor into them at approximately 670 miles per hour. The structured cubes dissipated the shocks five times better than solid cubes of the same material.

Although effective, it’s not clear that the fractal structure is the best shock-dissipating design. The researchers are investigating other void- or interface-based patterns in search of ideal structures to dissipate shocks. New optimization algorithms will guide their work to structures outside of those that consist of regular, repeating structures. Potential applications might include structural supports and protective layers for vehicles, helmets, or other human-wearable protection.

Simulations show how fractal structures of increasing complexity dissipate energy from shockwaves.
Faculty Development Programmes

The programme is designed to train and develop professionals in their area so that they can act as ‘Resource Persons’ in guiding and motivating young students.

Mr. Lathesh K, HOD ME, attended FDP to enhance the teaching learning process to implement outcome-based education. It helps to create awareness among faculty members about outcome based education, also helps to understand the process of outcome based education in NBA.

Mrs. Sabitha Rani, Asst. Professor, attended FDP on the topic “3D PRINTING” from MES Kuttipuram. The FDP focuses on the Introduction to Additive manufacturing techniques, mainly 3D printing. Sessions comprising of the 3D printing methods and introduction to the equipment used for the purpose, and the post processing techniques used in 3D printing were involved. The FDP also enlightened on the way of adopting innovative designing methods in product development, designing a product using Rhino software, converting the designed product into STL file and making it usable on a 3D printer. The participants were given hands on training in Rhino software and also given an opportunity to print a product designed by them on the Ultimaker 2 + 3D printing machine.

Mr. C.Sambarasan, Asst. Professor attended STTP focused on Industry 4.0 and its evaluation and provided an adequate knowledge about Industry 4.0 and automation. The STTP discusses the level of autonomy is growing gradually with less intervention of human being in manufacturing. Since the next generation industries need engineers with an interdisciplinary attitude and experience to meet the future demands. The FDP explore the potential areas and significance in the field of industrial robotics and automation.

Mr. Arjun P and Kiran Murali P, attended FDP on “ROBOTICS, AUTOMATION AND HANDS ON TRAINING ARDUINO” from MES kuttipuram. FDP promotes the understanding and use of conceptual, as well as practical knowledge of industrial automation, robotics and related technologies. The level of autonomy is growing gradually with less intervention of human being in manufacturing. Since the next generation industries need engineers with an interdisciplinary attitude and experience to meet the future demands. The FDP explore the potential areas and significance in the field of industrial robotics and automation.

Coronavirus Disease (COVID-19): The Impact and Role of Mass Media During the Pandemic

The outbreak of coronavirus disease 2019 (COVID-19) has created a global health crisis that has had a deep impact on the way we perceive our world and our everyday lives. Not only the rate of contagion and patterns of transmission threatens our sense of agency, but the safety measures put in place to contain the spread of the virus also require social distancing by refraining from doing what is inherently human, which is to find solace in the company of others. Within this context of physical threat, social and physical distancing, as well as public alarm, what has been (and can be) the role of the different mass media channels in our lives on individual, social and societal levels.

Mass media have long been recognized as powerful forces shaping how we experience the world and ourselves. This recognition is accompanied by a growing volume of research, that closely follows the footsteps of technological transformations (e.g. radio, movies, television, the internet, mobiles) and the zeitgeist (e.g. cold war, 9/11, climate change) in an attempt to map mass media major impacts on how we perceive ourselves, both as individuals and citizens. Are media (broadcast and digital) still able to convey a sense of unity reaching large audiences, or are messages lost in the noisy crowd of mass self-communication? Do social media provide solace or grounds for misinformation, humanization, and discrimination? Can we harness the flexibility and ubiquity of media technologies to increase the public’s adherence to the safety measures suggested by global health organisations to combat the spread of COVID-19? How can different media industries and channels for mass communication promote adaptive responses to foster positive health attitudes and adherence to preventive measures? How media impact the dynamics in the private domain (e.g. strengthen family bonds versus domestic conflict and violence).

Effective health communication for the adoption of sustainable preventive measures and curtailing misinformation;

Public health communication to increase psychological resources and resilience in distinct age groups and socioeconomic conditions;

Effective strategies for helping individuals in dealing with social and physical distancing.

Training Programmes for Students

- A training program was conducted for all students (S1, S2, S3). Training was provided so as to improve knowledge in the field of 3D printing and robotics.

- A online Auto-Quiz conducted for all students...

- Mechanical Engineering Department conducted a webinar to all B.Tech students to clarify the concepts of Fundamentals of Mechanical Engineering and its application.

Within this ample framework of complexity, we welcome research addressing media impact and its role during the COVID-19 pandemic, in the following: