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Topic of the Speech:

Computational and Analytical Studies on Sandwich Composites Reinforced with Hybrid Fibrous Materials and Bio-fillers

Professor Rajesh Mishra

Czech University of Life Sciences Prague
Czech Republic

Professor Rajesh Mishra works at the Czech University of Life Sciences Prague, Czech Republic. His research areas are nanomaterials and nano-textiles, textile structural composites, green composites, nanocomposites, biomechanical engineering of fibrous structures, thermo-mechanical characterization of materials etc.

He has about 200 publications in international journals and about 300 presentations in international conferences. His teaching and research activities include subjects based on nanotechnology, biomaterials, structural mechanics of fibrous structures in general and 3D woven structures in particular, textile quality characterization, engineering of textile structures, biomechanics of apparel textiles etc. He is responsible for internationals students' education and research at the faculty of engineering. Till date he has successfully guided 7 PhD candidates leading to award of title. The graduates are highly placed in academia and industry around the world. At present a few more are continuing research in leading areas of technology. He has also developed educational and research cooperation with many organizations around the globe.

ABSTRACT SUBMISSION
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Computational and Analytical Studies on Sandwich Composites Reinforced with Hybrid Fibrous Materials and Bio-fillers

Rajesh Mishra[1], Vijay Chandan[1], Miroslav Muller[1], Petr Jirku[1], Viktor Kolar[1], Shabnam Nazari[2] , Tatiana Alexiou Ivanova[2]

[1]*Department of Material Science and Manufacturing Technology, Faculty of Engineering, Czech University of Life Sciences Prague, Kamycka 129, 16500 Prague, Czech Republic*

[2]*Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Kamycka 129, 16500 Prague, Czech Republic*

[*]Presenter's email: mishrar@tf.czu.cz

ABSTRACT (NO MORE THAN 500 WORDS:)

The use of lightweight composite structures has several predictable impacts on the design of transport vehicles and construction materials, primarily by providing safer, faster, and eventually cheaper alternatives as compared to metal or concrete. The use of lightweight materials has become more prevalent as manufacturers strive to reduce lighter weight to improve performance, to lower fuel and oil consumption, and to reduce carbon emissions. Use of lightweight materials by hybridizing natural fibers and fillers with manmade materials e.g., glass, carbon or aramid is step in this direction. This approach also aligns with energy conservation regulations and policies, e.g., the European Commission with the End of Life Vehicles (ELV) European Union directive requiring vehicles to be constructed of 95% recyclable materials, with 85% recoverable through reuse or mechanical recycling and 10% through energy recovery or thermal recycling. Existing approaches for reducing mass include the use of less dense materials, e.g., metal foams and composite materials, or a decrease in the material volume by reducing wall thicknesses in key structural components. In both cases, less energy is needed for transportation of the ready-made product, so that the ecologically friendly aspect of lightweight construction is supported. By using low cost, eco-friendly, and reliable materials the environmental burden would be reduced for both the customer and the automotive industry. Important drivers of the growth of polymer composites have been the reduced weight and parts consolidation opportunities the material offers, as well as design flexibility, corrosion resistance, material anisotropy, and mechanical properties Polymer based sandwich composites with hybrid fiber materials and bio-fillers are used for developing various components suitable for engineering applications in transport and construction. The sandwich composites are developed from hybrid woven fabrics composed of carbon, glass, linen, jute fibers. Several sandwich composites are developed using commercial Epoxy resin. In addition, micro/nano fillers of cellulosic origin are added for advanced performance. The performance of the sandwich hybrid composites are compared with pure composites from carbon, glass, flax and jute fabrics. Similarly, the performance of pure resin and resin dispersed with micro-fillers were examined. The results were evaluated with respect to the influence of hybridization/layering on the tensile and flexural performance of sandwich composites. The influence of adding micro/nano fillers in a small percentage were evaluated as compared to other samples. The quasi static tensile, cyclic loading, flexural performance and fatigue are evaluated experimentally and compared with the predictions from computational analysis. The results are analyzed using statistical tools and software.