Editorial

Bent F. Sørensen and
R.T. Durai Prabhakaran*

Section of Composites and Materials Mechanics,
Department of Wind Energy,
Technical University of Denmark,
Frederiksborgvej 399, Building 228,
DK-4000 Roskilde, Denmark
E-mail: bsqr@dtu.dk
E-mail: rtdp@dtu.dk
*Corresponding author

Biographical notes: Bent F. Sørensen is the Head of the Section 'Composites and Materials Mechanics', Department of Wind Energy, The Technical University of Denmark (DTU). He received his PhD degree from the Department of Solid Mechanics at DTU in 1992 and obtained his DrTechn degree from DTU in 2010. His research field covers both experimental investigations and modelling of failure mechanisms, aiming at establishing links between microscale parameters and macroscale fracture properties. The focus of his research is interface fracture mechanics, in particular the measurement and modelling of cohesive laws for characterising large-scale cracking bridging cracking problems, such as the effects of larges-scale fibre bridging on the delamination of fibre composites and cracking of adhesively bonded joints.

R.T. Durai Prabhakaran is a Researcher at the Section 'Composites and Materials Mechanics', Department of Wind Energy, The Technical University of Denmark (DTU). Prior to DTU, he worked as an Assistant Professor/faculty for a period of seven and a half years (2001–2008), teaching undergraduate courses in Mechanical Engineering at Birla Institute of Technology and Science (BITS), Pilani and Goa campuses in India. He received his PhD degree from the Department of Mechanical Engineering, at BITS, Pilani in 2007 and obtained his MTech from the Indian Institute of Technology, New Delhi in 2000. His research field covers both experimental investigations and modelling of fibre/matrix interfaces, material characterisation of hybrid and natural fibre composites, processing of thermoplastic and thermoset composites.

Wind energy is one of the most competitive sustainable energy technologies. Recent research and development over the last decade has resulted in an impressive growth of the size wind turbines, with state of the art off-shore wind turbines are of about 2–3 MW and future wind turbines approaching 10 MW. Research in wind energy technology is truly a cross-disciplinary, covering areas such as aerodynamics, physics, materials science, mechanics, structural analysis, electricity and economy, and utilises various theoretical, computational and experimental methods.

The International Conference on Wind Energy: Materials, Engineering and Policies (WEMEP-2012) was held November 22–23, 2012, at the Birla Institute of Technology and Science (BITS), Pilani, at the Hyderabad Campus in Hyderabad, India. It was organised in collaboration with The Technical University of Denmark, BITS-Pilani and The Center for Wind Energy Technology (C-WET), Chennai. A purpose of the conference was to bring together researchers from many countries, working in the field together and establish connections for future collaborations across borders as well as across technical disciplines.

The conference topics included processing and characterisation of new types of composite materials, simulation of wind turbine components (e.g., rotor blades ad drive train), techniques for measurements of wind speeds, wind forecasts, planning of wind turbine parks, energy managements and wind power policy. The majority of the presentations concerned composites for wind turbine rotor blades. There were nearly 50 oral presentations and about ten poster presentations. There were 65 participants from more than five countries. The BITS-Pilani Hyderabad Campus provided very good facilities for the conference and was a very nice location. This enabled a lot of networking between the participants, resulting in a very successful conference.

This special issue of *IJMatEI* is intended to introduce readers to some of the challenges and issues associated with the 'materials and mechanics' of wind turbine blades. Some of the presentations are selected for publications in the following. They cover various aspects of composite materials for future wind turbine rotor blades, including treatment of surfaces of fibres and fracture mechanics of composite structures. Together they cover the main topics of the conference nicely.

The first paper by Durai Prabhakaran Raghavalu Thirumalai gives a thorough review of potential composite materials and its suitability for turbine blade developments. Hans Lilholt and Bo Madsen reviewed the performance of natural composites and its cellulose fibres. The two articles cover future material aspects and issues related to processing and performance of composite materials for turbine blade developments.

Henrik Myhre Jensen and Badrinath Veluri simulated crack growth at 3D corners of laminated structures. A fracture mechanics based approach is used to model the shape of interface cracks and calculating the critical stress for steady-state propagation. The implications of numerical results on the delamination are discussed in terms of crack front profiles and critical stresses. Kusano et al. demonstrated that plasma treatment of carbon and glass fibres reinforced polyester composites can be used for generating adhesion improvement resulting in higher fracture toughness, improved wettability and better adhesive strength. Adusumalli et al. proposed a nano-indentation technique to determine the mechanical properties of wood pulp cell walls. With these articles, the special issue covers both materials and mechanics topics relates to future development of turbine blades.

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