

## Institute of Textile Engineering and Polymer Materials



The Institute of Textile Engineering and Polymer Materials is part of the Faculty of Materials and Environmental Sciences at the University of Bielsko-Biala. The major task of the institute is to conduct research and development in the field of fibers, textiles and polymer composites with regard to manufacturing, modification, characterisation and processing.

The Institute of Textile Engineering and Polymer Materials has a variety of instrumentation necessary for research, development and testing in the textile and fibre field, with the expertise in the following scientific methods:

- FTIR (including mapping),
- Wide Angle X-Ray Scattering,
- Small Angle X-Ray Scattering,
- SEM (Scanning Electron Microscopy),
- Thermal Analysis (DSC, TGA)

Strong impact on research and development on geotextiles and geosynthetics make the Institute of Textile Engineering and Polymer Materials unique among the other textile institutions in Poland.

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- als using deflectometry, a full-field slope measurement technique. *Composites: Part A: Applied Science and Manufacturing* 2012; 43: 50-66.
12. Caminero MA, Lopez-Pedrosa M, Pinna C and Soutis C. Damage monitoring and analysis of composite laminates with an open hole and adhesively bonded repairs using digital image correlation. *Composites: Part B: Engineering* 2013; 53: 76-91.
  13. Xin B and Hu J. An image based method for characterizing the mechanical behaviors of fabrics. Part 1: The measurement of in-plane tensile behavior. *Fibres and Textiles in Eastern Europe* 2008; 16, 1(66): 72-75.
  14. Xin B, Li Y, Qiu J and Liu Y. Texture modeling of fabric appearance evaluation based on image analysis. *Fibres and Textiles in Eastern Europe* 2012; 20, 2(91): 48-52.
  15. Ezazshahabi N, Latifi M and Madanipour K.. Surface roughness assessment of woven fabrics using fringe projection moiré techniques. *Fibres and Textiles in Eastern Europe* 2015; 23, 3(111):76-84.
  16. YekaniFard M, Sadat SM, Raji BB and Chattopadhyay A. Damage characterization of surface and sub-surface defects in stitch-bonded biaxial carbon/epoxy composites. *Composites: Part B: Engineering* 2014; 56: 821-829.
  17. Chu TC, Ranson WF, Sutton MA, and Peters WH. Applications of digital-image-correlation techniques to experimental mechanics. *Experimental Mechanics* 1985; 25: 232-244.
  18. Pan B, QianK M, Xie HM and Asundi A.. Two-dimensional Digital Image Correlation for In-plane Displacement and Strain Measurement: A Review. *Measurement Science and Technology* 2009; 20: 062001.
  19. Pan B, Xie HM, Xu BQ and Dai FL. Performance of sub-pixel registration algorithms in digital image correlation. *Measurement Science and Technology* 2006; 17: 1615-1621.
  20. Pan B, Asundi A, Xie H M and Gao J X. Digital Image correlation using iterative least squares and point wise least squares for displacement field and strain field measurements. *Optics and Lasers in Engineering* 2009; 47: 865-874.
  21. Jin H Q and Bruck H A. Theoretical development for pointwise digital image correlation. *Optical Engineering* 2005; 44: 1-14.
  22. Cheng P, Sutton MA, Schreier HW and McNeill SR. Full-field speckle pattern image correlation with B-spline deformation function. *Experimental Mechanics* 2002; 42: 344-352.
  23. Sun Y, Pang JHL, Wong CK and Su F. Finite element formulation for a digital image correlation method. *Applied Optics* 2005; 44: 7357-7363.
  24. Besnard G, Hild F and Roux S. Finite-element displacement fields analysis from digital images: application to Portevin-le chatelier bands, *Experimental Mechanics* 2006; 46: 789-803.
  25. Rethore J, Hild F and Roux S. Shear-band capturing using a multiscale extended digital image correlation technique. *Computer Methods Applied Mechanics Engineering* 2007; 196: 5016-5030.
  26. Rethore J, Hild F and Roux S. Extended digital image correlation with crack shape optimization. *International Journal of Numerical Methods in Engineering* 2008; 732: 248-272.
  27. Bruck HA, McNeil SR, Sutton MA and Peters WH. Digital image correlation using Newton-Raphson method of partial differential correction, *Experimental Mechanics* 1989; 29: 261-267.
  28. Vendroux G and Knauss WG. Submicron Deformation Field Measurements: Part 2 improved Digital Image Correlation. *Experimental Mechanics* 1998; 38: 86-92.
  29. Pan B. Reliability-guided digital image correlation for image deformation measurement. *Applied Optics* 2009; 48: 1535-1542.
  30. ASTM International. (2001). *Standard Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method*, ASTM D 1907- 01. West Conshohocken, PA: Annual book of ASTM standards.
  31. ASTM International. (2002). *Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method1*, ASTM D 2256- 02. West Conshohocken, PA: Annual book of ASTM standards.
  32. ASTM International (1995) *Standard test method for breaking force and elongation of textile fabrics (strip method)*, ASTM D 5035- 95. West Conshohocken, PA: Annual book of ASTM standards.
  33. <http://www.opticist.org/node/73>.
  34. Pan B, Xie HM, Guo ZQ and Hua T. Full-field strain measurement using a two-dimensional Savitzky-Golay digital differentiator in digital image correlation. *Optical Engineering* 2007; 46: 033601.
  35. Montgomery DC. *Introduction of Linear Regression Analysis*, 5<sup>th</sup> ed. meas Hoboken, New Jersey: Wiley Series in Probability and Statistics, 2012.

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