Theory of Yarn Structures - Video course

COURSE OUTLINE

Compression of fibrous assemblies, Pores among fibres, Orientation of fibres, Mechanics of parallel fibre bundles, Modelling of intern al yarn geometry, Relations among yarn count, twist, packing density, and diameter, A stochastic model of yarn hairiness, Bundle theory of yarn unevenness, Yarn strength as stochastic process.

COURSE DETAIL

Lecture	Title	Content
1	Compression of fibrous assemblies	C. M. van Wyk's theory, generalization of van wyk's theory, comparison between theoretical and experiment results
2	Pores among fibres	Pores and their characteristics, relationship between fibers and pores, types of pores, applications
3	Orientation of fibres	Orientation vector, isotropic fibre orientation, model of anisotropic fibre orientation, orientation of fibres in three-dimensional sections, mechanical behaviour
4	Mechanics of parallel fibre bundles	Hamburger's model, tensile behavior of fibre bundles considering different mechanical properties of fibers, examples

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5	Modelling of intern al yarn geometry	General description of fibers in yarns, helical model of yarn, yarn retraction in ideal helical model, yarn stress-strain relation, model of radial fibre migration, model of equidistant migration, comparison between theoretical and experimental results,
6	Relations among yarn count, twist, packing density, and diameter	Koechlin's concept, empirical corrections to Koechlin's theory, mechanistic model, comparison between theoretical and experimental results
7	A stochastic model of yarn hairiness	Hairiness sphere, single exponential model, double exponential model, comparison between theoretical and experimental results
8	Bundle theory of yarn unevenness	Martindale's theory of unevenness, theory of fibre bundles, comparison between theoretical and experimental results
9	Yarn strength as stochastic process	Peirce's model of yarn strength, SEMG stochastic model of yarn strength, comparison between theoretical and experimental results

References:

1. Theory of structure and mechanics of fibrous assemblies, Bohuslav Neckar
and Dipayan Das, Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.

2. Structural mechanics of fibres, yarns, and fabrics, J. W. S. Hearle, P. Grosberg, Stanley Backer, Wiley-Interscience, 1969.