University of Debrecen
Informatics Doctoral School

Topics of Complex exam in Industrial and scientific applications of informatics program by Husi Géza

Minor Subject Model Investigation of Technical Systems

Syllabus

1. Theory of Bond graph: (is an explicit graphical tool for capturing the common energy structure of systems) Power variables of Bond Graphs, Bond Graph Standard Elements, Basic 2-Port elements, The 3-Port junction elements.
2. Theory of Bond graph: Power directions on the bonds, Assigning numbers to bonds, Causality, Generation of system equations, algebraic loops, Causal loops, Power loops, and Differential Causalities
3. Bond graph modeling: mechanical system, two degrees of freedom mechanical system, electrical system, hydraulic system, thermal system, magnetic system, Method of Flow Map, Method of Effort Map, Method of Mixed Map.
4. Bond graphs of electrical circuits: Method of Gradual Uncover, Point Potential Method, Mixed Network Method.
5. Gyrator and transformer combinations: Combination of gyrators and sources, Combination of a gyrators and transformers with storage and resistive elements, Combination of gyrators and junction elements, Dual Models, Multi and vector bond graphs

Literature

1. Arun Kumar Samantaray, Belkacem Ould Bouamama : Model-based process supervision: a bond graph approach, 2008/3/14, Publisher, Springer Science & Business Media
2. Jan F. Broenink : Introduction to Physical Systems Modelling with Bond Graphs Jan F. Broenink University of Twente, Dept EE, Control Laboratory PO Box 217, NL-7500 AE Enschede Netherlands
3. Borutzky, W: Bond Graph metolodogy Spinger 2010, ISBN 979-1-84882-881-0
4. W Borutzky : Bond graph modelling of engineering systems - 2011 - Springer