NPTEL Video Course - Electrical Engineering - NOC:Digital Control in Switched Mode Power Converters and FPGA-

Subject Co-ordinator - Prof. Santanu Kapat

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 30 - MATLAB Model Development for Digital Current Hysteresis Control
Lecture 31 - Continuous-Time Small-Signal Modeling under Digital Control
Lecture 32 - Discrete Time Modeling with Closed Current Loop
Lecture 33 - State-Space Modeling and Steps For Deriving Discrete-Time Models
Lecture 34 - Derivation of Discrete-Time Large-Signal Models
Lecture 35 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part I
Lecture 36 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part II
Lecture 37 - Derivation of Discrete-Time Small-Signal Models - I
Lecture 38 - Derivation of Discrete-Time Small-Signal Models - II
Lecture 39 - Discrete-Time Transfer Functions and Closed Loop Block Diagrams
Lecture 40 - Model Accuracy with MATLAB Case Studies - Comparative Study
Lecture 41 - Continuous-Time to Discrete-Time Conversion Methods - A Summary
Lecture 42 - Recap of Frequency Domain Design of Analog VMC and CMC
Lecture 43 - Design under Digital Voltage Mode Control - Frequency Domain Approaches
Lecture 44 - Design under Digital Current Mode Control - Frequency Domain Approaches
Lecture 45 - Design Case Study and MATLAB Simulation of Digital Voltage Mode Control
Lecture 46 - Design Case Study and MATLAB Simulation of Digital Current Mode Control
Lecture 47 - Time Optimal Control of a Buck Converter and Identifying Performance Limits
Lecture 48 - Trajectory based CMC Design for Proximate Time Optimal Recovery
Lecture 49 - Trajectory based Digital CMC Tuning and MATLAB Case Studies
Lecture 50 - Digital Pulse Skipping Control and MATLAB Simulation Case Studies
Lecture 51 - Selection of ADC and DAC in Digitally Controlled SMPCs
Lecture 52 - High Frequency Current Sensing Techniques in Digitally Controlled SMPCs
Lecture 53 - Current Sensing Techniques in Digitally Controlled High Power Converters
Lecture 54 - Signal Conditioning Circuits and PCB Design for Mixed-Signal Implementation
Lecture 55 - Reference Power Stage Design and Schematic for Buck and Boost Converters - I
Lecture 56 - Reference Power Stage Design and Schematic for Buck and Boost Converters - II
Lecture 57 - Step-by-Step Guidelines for Digital Control Implementation using FPGA
Lecture 58 - Test and Measurement of a Buck Converter using Digital Storage Oscilloscope
Lecture 59 - Functionalities in Mixed Signal Oscilloscope for Validating Digital Control
Lecture 60 - Power Spectrum Analysis of SMPCs using Mixed-Signal Oscilloscope
Lecture 61 - Introduction to Verilog Hardware Description Language (HDL)
Lecture 62 - Guidelines for Verilog HDL Programming - Some Key Rules
Lecture 63 - Structural and Dataflow Modeling in Verilog HDL for Combinational Logics
Lecture 64 - Behavioral Modeling in Verilog HDL for Sequential Digital Circuits
Lecture 65 - Simulation of Verilog-HDL based Design using Xilinx Webpack - I
Lecture 66 - Simulation of Verilog-HDL based Design using Xilinx Webpack - II
Lecture 67 - Fixed Point Implementation in Embedded Control System
Lecture 68 - Fixed Point Arithmetic and Concept of Q Format

Lecture 69 - Counter-based DPWM with Deadtime and Verilog HDL Programming
Lecture 70 - Simulating Counter-based DPWM with Deadtime using Xilinx ISE Simulator
Lecture 71 - Top Down Design Methodology in Digital Voltage Mode Control - I
Lecture 72 - Top Down Design Methodology in Digital Voltage Mode Control - II
Lecture 73 - Digital PID Control Implementation using Verilog HDL Programming
Lecture 74 - Digital PID Controller - Hardware Implementation and Experimental Results
Lecture 75 - Top Down Design Methodology in Mixed-Signal Current Mode Control
Lecture 76 - Top Down Design Method and Verilog HDL Programming of Mixed-Signal CMC
Lecture 77 - Verilog HDL based Digital PI Control Implementation of Mixed-Signal CMC
Lecture 78 - Hardware Implementation of Mixed-Signal CMC and Experimental Results
Lecture 79 - Voltage based Digital Pulse Skip Modulation and Top Down Design Method
Lecture 80 - Implementing Digital Pulse Skip Modulation and Experimental Results
Lecture 81 - STM32 Overview and STM32G4x ecosystem
Lecture 82 - Getting started with STM32CubeMX - Part I
Lecture 83 - Getting started with STM32CubeMX - Part II
Lecture 84 - Practical implementation of LLC converters - Part I
Lecture 85 - Practical implementation of LLC converters - Part II
Lecture 86 - Texas Instruments C2000 Real-time Microcontroller Devices
Lecture 87 - Getting Started with C2000 - Software and Hardware Development
Lecture 88 - Texas Instruments C2000 key peripheral differentiations
Lecture 89 - Texas Instruments TIDM-02008 Reference Design Overview
Lecture 90 - Texas Instruments TIDM-02008 Reference Design Software Overview
Lecture 91 - Steps for FPGA Implementation of Digital Voltage Mode Control
Lecture 92 - Steps for FPGA Implementation of Mixed-Signal Current Mode Control
Lecture 93 - Instability in Digital CMC and Ramp Compensation with Experimental Results
Lecture 94 - Benefits of Constant Off-Time and On-Time Digital CMC Techniques
Lecture 95 - Top Down Design Methodology of Constant On/Off-Time Control
Lecture 96 - Verilog HDL Implementation of Voltage based Constant On-Time Control
Lecture 97 - FPGA Implementation of Constant On/Off-Time Mixed-Signal CMC
Lecture 98 - Stability Comparison of Fixed and Variable Freq. Digital CMC with Experimental Results
Lecture 99 - Assessment of Digital Control Techniques for Light Load DC-DC Converters
Lecture 100 - Adaptive On-Time Digital Control in DCM with Verilog HDL Implementation
Lecture 101 - MATLAB Simulation of a Practical Digital VMC Buck Converter in CCM
Lecture 102 - Data Acquisition and Steps for Validating Simulation and Experimental Results
Lecture 103 - Loop Shaping and Design of Digital Voltage Mode Control in a Buck Converter
Lecture 104 - Digital VMC Design for Shaping Output Impedance in a Buck Converter
Lecture 105 - Hardware Case Studies and Transient Performance in Digital VMC Buck Converter
Lecture 106 - Design and Simulation Case Studies in a Mixed-Signal CMC Buck Converter
Lecture 107 - Hardware Case Studies and Transient Performance in a Digital CMC Buck Converter