QCM

Finale SM50 Examen du 11/01/2023 Nom et prénom :

Duration : 60 minutes.

No document allowed. The use of the calculator is forbidden. This exam is a multiple choice test (QCM - Questions à Choix Multiple), for every question there is only ONE correct answer. In total there are 25 questions, every correct response gives +0.8points, every wrong answer or question with multiple answers gives -0.4 points, if you do not answer you get 0 points.

Thank you to make a cross or fill the box of your answer with a good readable pen (black or blue).

A Latency-Insensitive Design Approach to Programmable FPGA-Based Real-Time Simulators

Jean-Baptiste Marchal Theo Lacassin

What is the problem with FPGA? Question [MarchalLacassin-Q1]

Very versatile, but this versatility imposes difficulties of latency.

Limited number of calculations.

Cannot do prallel computing.

Question [MarchalLacassin-Q2] How did the researchers measure the performance of FPGA architectures?

Low step time or high flop number. Temperature of the board.

Cost per gigaflops.

Question [MarchalLacassin-Q3] How did they imporve the perfomance?

Using overlay architecture

- Using sequential calculation
- Using float numbers

Question [MarchalLacassin-Q4] What are the problems of FPGA?

Complex Design and Time consuming development.

Programmable and updatable.

Parallel Calculations.

A Review of PHIL Testing for Smart Grids-Selection Guide, Classification and **Online Database Analysis** Clement Piot Alexis Piontek

Question [PiotPiontek-Q01] What is the difference between Controller HIL and PHIL?

In CHIL only the controller is real and there is no power stage, in PHIL there is a power stage.

That are different names for the same thing.

In CHIL you only control a system in PHIL you also process the data.

SM50

Question [PiotPiontek-Q02] Why is it difficult to do tests on a real system?

Cannot be reconfigured, cannot test risk situations.

Cannot be refigurated, cannot be accelerated.

Cannot be certified, cannot test risk situations.

Question [PiotPiontek-Q3] What is the advantage of PHIL in link to smart grid (conclusion slide)?



You can use for example a real car in link with the analysis.

You can use for example a real car in link with a real controller.

You can use for example a simulated car in link with the analysis.

Question [PiotPiontek-Q4] Is a PHIL a real time simulation?

yes, it is

no it isn't

maybe

Question [PiotPiontek-Q5] What is the additional element for a power hardware in the loop system compared to HIL.

Power Amplifier Real-time simulator

Model

Emulator of a Boost Converter for Educational Purposes Yann Vauthier Hugo Renoux

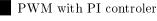
Question [VauthierRenoux-Q1] What is the object of the presentation?

Pedagogic Boost Converter

Test bench for trunk opening

Artificial heart

Question [VauthierRenoux-Q2] How the boost converter is controled? PWM with PI controler



GA with P controler

Flip-flop with PID controler

Question [VauthierRenoux-Q3] Two hardware devices are used, what are they used for?

One for Boost Converter, one for Controller

One for Boost Converter, one for Temperature Sensor

One for Voltag Sensor, one for Controller

Question [VauthierRenoux-Q4] What does a boost converter?

Producing a higher voltage level across the load than the source in DC-DC.

Producing a smaller voltage level across the load than the source in DC-DC.

Producing a higher voltage levels in AC-DC.

Question [VauthierRenoux-Q5] Why did we chose to use HIL to make a Boost converter?

It's easier,	cheaper	and	safer
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Because we can't control the sistem without a HIL.

Because we want a better time response.

Hardware in the Loop Implementation of the Oscillator-based Heart Model: A Framework for Testing Medical Devices Mathilde Kuntz Alessia Manni

Question [KuntzManni-Q1] What is the analogy for muscles in a machine?

Act	uators

Sensors

Microphone

Question [KuntzManni-Q2] What part of the body was simulated in HIL?

Heart

Knee

Eye

Question [KuntzManni-Q3] What kind of hardware has been used?

Typhoon HIL

] Matlab Simulink

National Instruments

Question [KuntzManni-Q4] The human body could be compared to a machine. What would be the equivalent to sensors and microcontrollers?

The 5 senses (sight, smell, touch) and microcontrollers?

Listening/reading and motors.

Nervous system and audio signalling devices.

Question [KuntzManni-Q5] Which of these elements is NOT PRESENT in HIL model used to simulate the heart?

electrical conduction system

Blocks representing waves of ECG

Analysis of Resolution in Feedback Signals for Hardware-in-the-Loop Models of Power Converters

Agathe Joly

Question [Joly-Q01] What is the goal of the article? Limit the number of bits used for calculation



Limit the number of bits used for calculation

Limit the number of steps used for calculation

Limit the number of processors used for calculation

Question [Joly-Q02] What determination method was used? Analytic

Analytic

____ Determinisitc

Integral

Question [Joly-Q3] Can the number of bits for feedback signals be reduced?

Yes in coherence with input signals and signal variation.

No it is fixed by the model.

Depends on the option of the model.

Question [Joly-Q4] What are the benefits of analyse the number of its in feeedback signals of a boost converter?

Saving energy during transmission by avoiding the loss of bits.

Avoiding the waste of bits during transmission.

Decreasing the overall error.

A Comparison of Filtering Approaches Using Low-Speed DACs for Hardware-in-the-Loop Implemented in FPGAs Ayman Ghanem Emile Coulon

Question [GhanemCoulon-Q01] Why do you have use a filter?

Improve	data	qualit

Decrease energy consumption

Increase step time

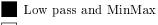
Question [GhanemCoulon-Q02] How the quality of the filter response is studied?

Step response as input of buck converter

Step change of disturbion

Increase of step time

Question [GhanemCoulon-Q3] what filters are used to combine to create a hybrid filter?



Hybrid filter is independant

Runge and Kutta

Question [GhanemCoulon-Q4] Why do we use input filters in FPGA?

Because low speed DACs struggle to get all signals.

] To consume less.

To improve the accuracy of the signals.

Question [GhanemCoulon-Q5] What is the filter you can use for any waveform (because of its low set latency)?

MAV filter Max-Min filter

] Hybrid filter

Hardware-in-the-Loop Simul	lations: A Historical Overview of Engineering Challenges Suzana Rapp Emeline Rocquet
Question [RappRocquet-Q1]	What is the most common field of application for HIL?
Automotive domaine, Mari Biological domain, Medical Electronic domain, Quantu	
$\mathbf{Question}$ [RappRocquet-Q2]	When and by whome HIL was first applied?
 1950 Nasa 2010 Femto-ST 1975 CERN 	
Question [RappRocquet-Q3] ulation (give at least 3 examples	Which types of transport have been presented used for HIL sim-). rockets W: W: Only boats
 Atomotive, trains, boats Automotive, bus, scooter Boats, rockets, robots 	
Question [RappRocquet-Q4]	What was was the personal experience presented?
Using Tyhoon softwar and	HIL as a test bench for trunck opening. HIL as a test bench for hybrid ships. a test bench for DC-AC converter.
Question [RappRocquet-Q5] UTBM project to cntrol the comm	Which software have we used for the ariplane H2 and car H2 munication with the fuel cell? R: Typhoon W: LabView W:Dspace
Typhoon LabView dSpace	
	e-Phase Amplitude and Phase Angle Detection Based on ntegral and Derivative Actions Samba Babou Clement Bouchet
$\mathbf{Question}$ [BabouBouchet-Q1]	What is the problem behind the study?
That the model works on t	he right scale of frequencies.
That the model has a too l	-
That the model consumes \cdot	too much energy.
$\mathbf{Question}$ [BabouBouchet-Q2]	Adding an constant ki and a pole ?
Only keep lower frequencie	s and surpress the higher frequencies.
	es and change number type.
Only keep lower frequencie	s and increase time step.
$\mathbf{Question}$ [BabouBouchet-Q3]	What parameters will be changed?
Integral gain and derivative Step time.	e gain.

FPGA controller.

What is the main problem of PLL and EPLL to detect phase Question [BabouBouchet-Q4] angle and frequency?



The problem is they only work at a referance frequency.

The response is very slow to the phase angle jump.

They can't detect phase angle.

Question [BabouBouchet-Q5] What is the main advantage between the proposed model of this study and the other models existing?

The proposed model can be implemented with analog and also digital systems.

The proposed model can allow small processing time step.

The proposed model can allow cost reduction because analog compontents are used.

Comparison of Power Converter Models with Losses for Hardware-in-the-Loop **Using Different Numerical Formats** Lucile Kurbanova Natan Dugour

Question [KurbanovaDougur-Q1] What type of converter was studied?

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Interlaced converter

Two step converter

Question [KurbanovaDougur-Q2] What are the three types of number representation studied?

Real type, Floating point type, Fixed point type

Real type, Boolean type, Fixed point type

Real type, Floating point type, Integer type

Question [KurbanovaDougur-Q3] What happens when you take the losses into account?

Faster stabilization of the system

Lower time step

More oscillation

Question [KurbanovaDougur-Q4] What is the main drawback of the fixed point numerical type?

It requires more design efforts to determine the signal width.

It achives bigger simulation steps.

It does not respect to IEEE 754.