



# Zemships Final Conference, Hamburg

20. April 2010



Gefördert durch die EC / Financial Support given by the EC



## The Company

Ústav jaderného výzkumu a.s. / Nuclear Research Institute Řež plc.

Main activities :

- Research and Development in the Field of Nuclear Technology and Radioactive Waste Management in Power Generation and Industry
- Design and Engineering Services in Capital Construction
- Production and Distribution of Radiopharmaceuticals
- Operation of Research Reactors
- Control of Life Cycle of Power Plants and its Maintenance
- **Hydrogen Activities**

## Hydrogen Activities

- TriHyBus – 12 m bus powered by hydrogen ([www.h2bus.cz](http://www.h2bus.cz))
  - Cooperation with PM
  - Triple Hybrid concept
  - Operation phase - 2010
- Purification of waste hydrogen from chemical industry
- Hydrogen production from nuclear sources – *in preparation*
  - High temperature electrolysis
- **Zemships project**



## Mathematical model of propulsion

Cooperation with ČVUT – FEL (Czech Technical University in Prague, Faculty of Electrometrical Engineering)

Designed for:

- Optimization of driving strategy based on real characteristics of ship power requirements.

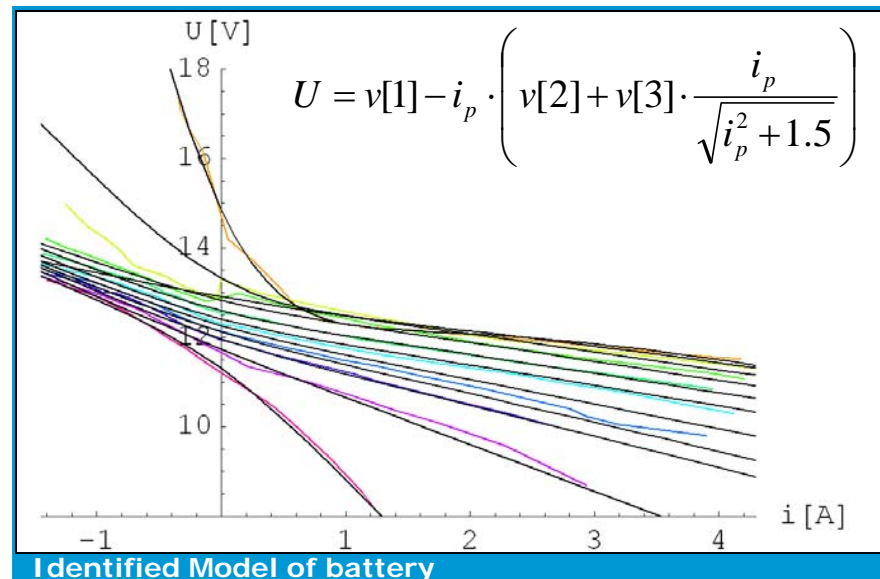
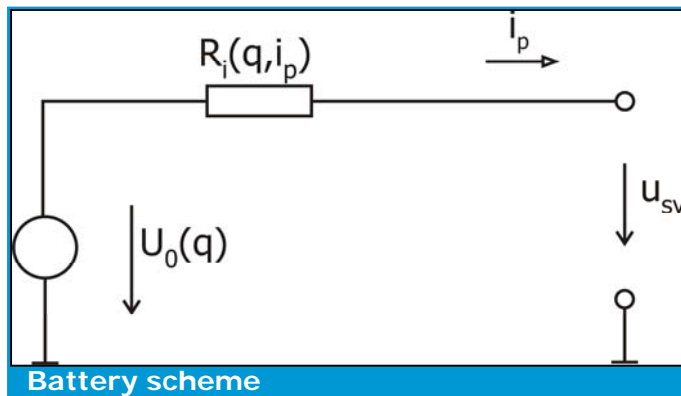
Work was divided into:

- Identification part – mathematical modeling of each component of the propulsion system
- Model building
- Simulation with real data input

## Model – Battery

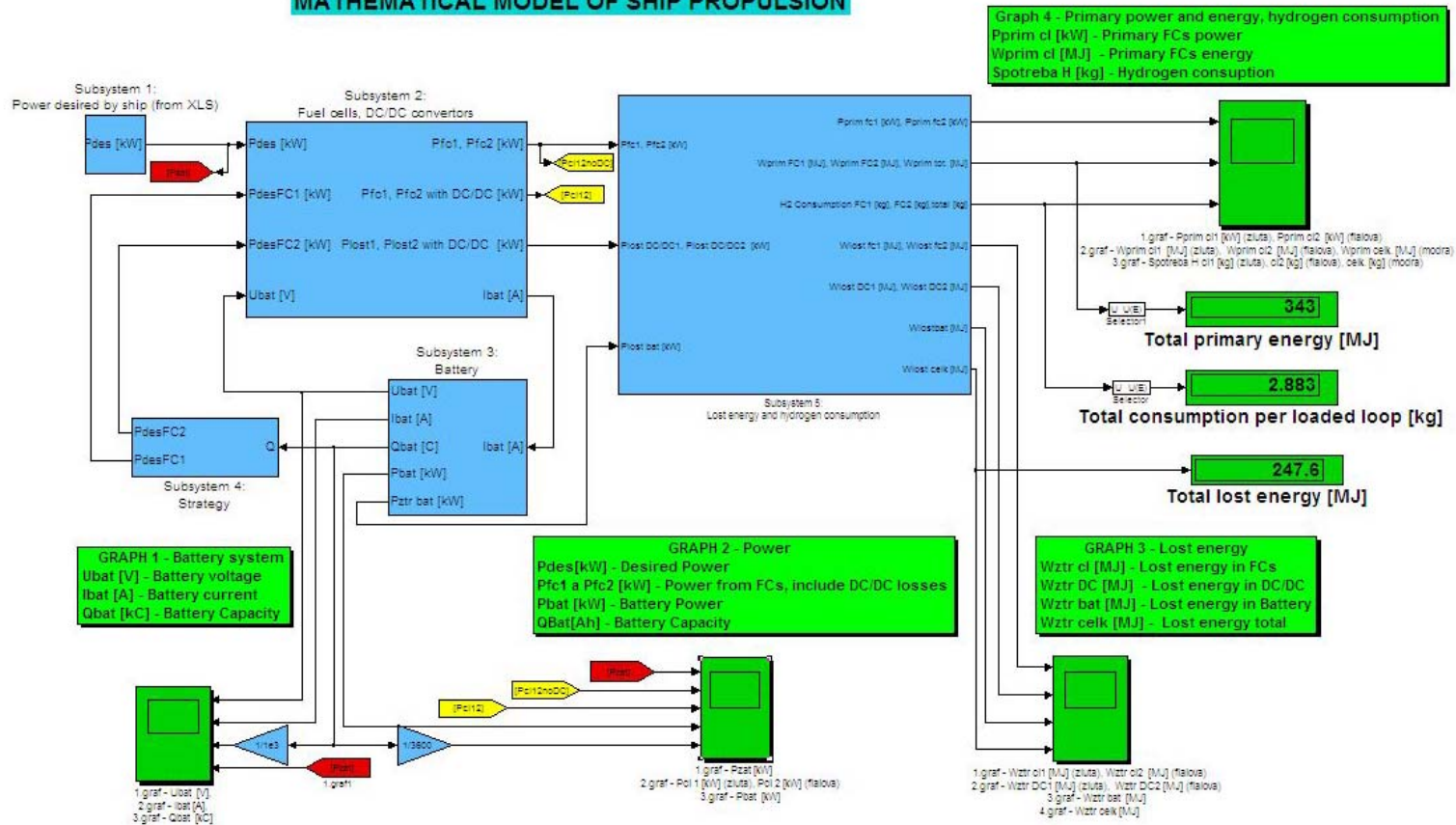
- Model of Battery was identified on same technology based battery pack with different power – real measurement

$$u_{sv} = U_0(q) - i_p \cdot R_i(q, i_p)$$



# Model of propulsion

## MATHEMATICAL MODEL OF SHIP PROPULSION



## Visualization

- Designed for 1280 x 1024 pxs
- Placed in a front left side of ship
- Designed for public
- Contain:
  - „Analog“ indicators for FC, Battery
  - Historic trends
  - Hybrid box – short explanation of current drive mode
  - GPS map module

