STORHY Final Event

Hydrogen Storage Systems for Automotive Application

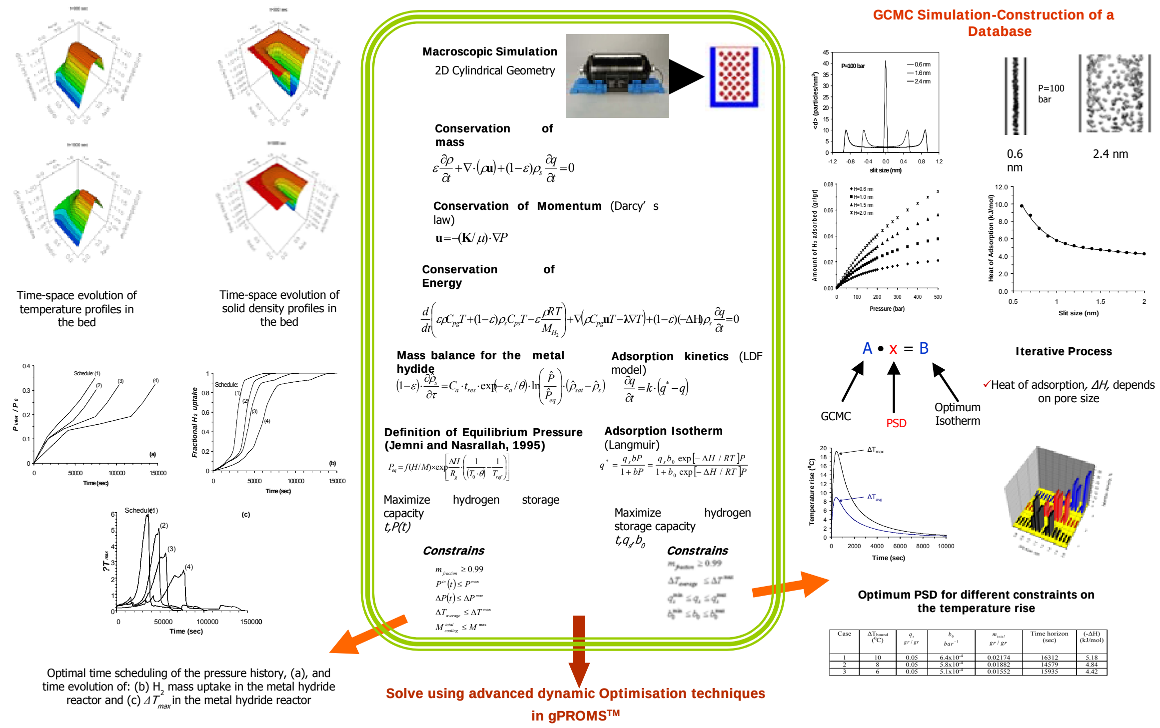
PSA Poissy, June 3-4, 2008

Modelling and Optimisation of Hydrogen Solid Storage Systems

Objectives

- An integrated modeling and optimization based approach and simulation tool has been developed for the efficient, safe and economic design of solid hydrogen storage tanks using advanced solid materials
- Recent advances on dynamic optimisation are utilized to develop optimal operating policies and novel cooling system design options for hydrogen storage in solids

Achievements



The approach takes into account realistic operating constraints related to maximum allowable tank temperature, maximum pressure drop and cooling fluid availability. A multi-scale modelling and optimisation framework is also investigated to explore the synergistic benefits between material design and storage processes, design and operation. Results indicate how process operating constraints, potentially expressing safety concerns, can affect material design. In particular:

- Significant improvements in the total storage time can be achieved when optimising the design of cooling systems in metal hydride beds.
- Optimal H_2 charging rate is an important control variable to ensure satisfaction of maximum temperature limitations inside the bed.
- Process operating constraints, expressing safety considerations, can significantly affect optimal Pore Size Distributions in nanoporous carbons.

Future Perspectives

- The tool is available for further testing and use in realistic tank design environments and applications

Partners

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