Processi, prodotti e servizi
Processes, products and services

DII research group
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Main research topics:

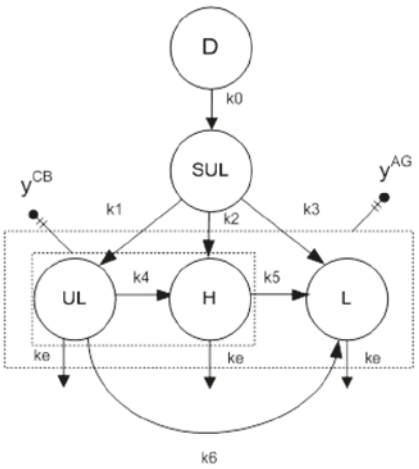
- Product design and quality control
- Data analysis and process control
- Model development and identification
- Design of energy systems
- Biomedical systems modeling and control

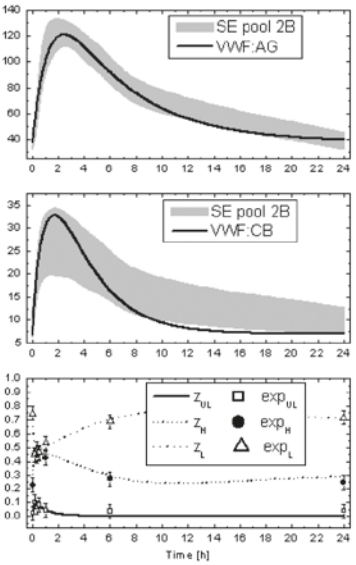
Toward personalized care of blood coagulation disorders

The von **Willebrand disease** (vWD) is the most common inherited blood coagulation disorder in humans. The disease is characterized by a deficiency and/or dysfunction of the von Willebrand factor (vWF), a large multimeric glycoprotein mediating the adhesion and aggregation of platelets to the subendothelium and carrying the coagulation factor VIII in the blood circulation. The predominant clinical symptoms of vWD include nosebleeds, bleeding from small lesions in skin, mucosa or the gastrointestinal tract, menorrhagia and excessive bleeding after traumas, surgical interventions or childbirth. According to a recent estimate, over half a million persons suffer from vWD worldwide, with ~80% of them living in the emerging countries. Diagnosing vWD is complicated by the fact that several variants of the disease exist, which are not easy to capture from conventional tests.

An interdisciplinary research between CAPE-Lab and the University of Padova Medical School has shed new light into the characterization of vWD.
Two mechanistic models of the vWD have been formulated based on clinical data, and can now assist physicians to describe the mechanisms of release, distribution and elimination of the vWF from the blood stream. This is an important step toward faster and more effective vWD diagnosis, as well as toward the development of shorter and easier-to-carry-out clinical tests, improving the comfort and safety for the subject. The research was granted the prestigious Model-Based Innovation Prize 2014 by Process Systems Enterprise Ltd. (London, U.K.).

Current work is devoted to extending the model applicability, and to engineering a model-based diagnosis procedure in order to automatically discriminate among the possible vWD variants.





Galvanin, F., M. Barolo, R. Padrini, A. Casonato and F. Bezzo (2014). A model-based approach to the automatic diagnosis of Von Willebrand disease. *AIChE J.*, **60**, 1718-1727.