Cybow Modeller
- Yet Another Cell Modelling Environment

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Introduction

- Cybow Modeller is a software suite for cell modelling
- Features
  - Graphical & user-friendly interface with assists
  - Semantic annotations of variables with CPO
  - C++ code generator (under development)
  - OS independent: implemented in Java & XSLT
  - Open source: available at SourceForge.net
Modelling Workflow

Define components

Compose model

\[ I_{KATP} = N \cdot \gamma \cdot (V_m - E_K) \cdot p(open) \]

\[ \gamma = 0.0236 \cdot \left[ K^+ \right]^{0.24} \]

\[ p(open) = \frac{0.8}{1 + \left( \frac{\left[ ATP \right]}{0.1} \right)^2} \]
Component Editor

- Graphical rendering of math equations
- Simple one-line text input of a equation
- Graphical symbols for variables
- Annotation to model variables
- HTML document output
- Exportable equations to MS Office 2007
p(open) = \frac{1}{1 + K_+ o}
Model Composer

- Graphical editing of model composition
- Components & quantities on hierarchical compartments
- Automatic assistance by using annotations
extracellular fluid

Variables inserted automatically

cell

extracellular fluid
Add a component from another model

- \( t \): time
- \( V_m \): \( V \)

Links connected automatically
Compatibility with CellML

- Original XML formats for components & compositions
  - Bindings are automatically generated from XSDs
- Translator from/to CellML in XSLT available
  - from CellML 1.0/1.1
    - import not supported
  - to CellML 1.1
    - variable symbols & annotations lost
    - not fully compatible yet
Code Generator

- C++ source codes, which uses LAPACK & CVODE
- Supports for semi-explicit DAE
  - doi: 10.1109/IEMBS.2009.5335041
- Not opened yet: prototype implementation
Summary

- Cybow Modeller: a software suite for cell modelling
  - Component Editor
  - Model Composer
  - CellML Translator
  - C++ Code Generator (under development)
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