SBML Model Report

Model name: "Holmes2006_MuscleContration"

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following three authors: Paul Harrington[1], Paul Harrington[2] and Paul Harrington[3] at June 25th 2010 at 12:07 a. m. and last time modified at June 25th 2010 at 12:07 a. m. Table 1 shows an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	0
events	0	constraints	0
reactions	0	function definitions	0
global parameters	10	unit definitions	3
rules	5	initial assignments	0

Model Notes

This a model from the article:
Teaching from classic papers: Hill's model of muscle contraction.
Holmes JW. Adv Physiol Educ 2006 Jun;30(2):67-72 16709736 ,

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Abstract:
A. V. Hill's 1938 paper „The heat of shortening and the dynamic constants ofmuscle„ is an enduring classic, presenting detailed methods, meticulousexperiments, and the model of muscle contraction that now bears Hill's name.Pairing a simulation based on Hill's model with a reading of his paper allowsstudents to follow his thought process to discover key principles of muscle-physiology and gain insight into how to develop quantitative models ofphysiological processes. In this article, the experience of the author usingthis approach in a graduate biomedical engineering course is outlined, alongwith suggestions for adapting this approach to other audiences.

This model was taken from the CellML repository and automatically converted to SBML.
The original model was: **Holmes JW. (2006) - version=1.0**
The original CellML model was created by:
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2 Unit Definitions

This is an overview of eight unit definitions of which five are predefined by SBML and not mentioned in the model.

2.1 Unit `ms`

Name ms

Definition ms

2.2 Unit `mNpermmsq`

Name mNpermmsq

Definition $\mathrm{mN} \cdot \mathrm{mm}^{-2}$

2.3 Unit pms

Name pms

Definition ms^{-1}

2.4 Unit substance

Notes Mole is the predefined SBML unit for `substance`.

Definition mol

2.5 Unit volume

Notes Litre is the predefined SBML unit for `volume`.

Definition l

2.6 Unit area

Notes Square metre is the predefined SBML unit for `area` since SBML Level 2 Version 1.

Definition m^2

2.7 Unit length

Notes Metre is the predefined SBML unit for `length` since SBML Level 2 Version 1.

Definition m

2.8 Unit time

Notes Second is the predefined SBML unit for `time`.

Definition s

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
COMpartment			3	1		☑	

3.1 Compartment COMpartment

This is a three dimensional compartment with a constant size of one litre.

4 Parameters

This model contains ten global parameters.

Table 3: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
a	a		37.240		☑
b	b		0.325		☑
Po	Po		144.900		☑
alpha	alpha		1449.027		☑
L_se_o	L_se_o		0.300		☑
L	L		0.000		☐
v	v		0.000		☐
L_se	L_se		0.000		☐
L_ce	L_ce		0.700		☐
P	P		0.000		☐

5 Rules

This is an overview of five rules.

5.1 Rule L_ce

Rule L_ce is a rate rule for parameter L_ce:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L\_ce} = \mathrm{v} \tag{1}$$

5.2 Rule L_se

Rule L_se is an assignment rule for parameter L_se:

$$\mathrm{L\_se} = \mathrm{L} - \mathrm{L\_ce} \tag{2}$$

5.3 Rule L

Rule L is an assignment rule for parameter L:

$$\mathrm{L} = \begin{cases} 1 & \text{if time} \leq 1 \\ 0.92 & \text{if } (\text{time} > 1) \wedge (\text{time} < 5) \\ 0.9 & \text{otherwise} \end{cases} \tag{3}$$

5.4 Rule P

Rule P is an assignment rule for parameter P:

$$\mathrm{P} = \mathrm{alpha} \cdot (\mathrm{L\_se} - \mathrm{L\_se\_o}) \tag{4}$$

5.5 Rule v

Rule v is an assignment rule for parameter v:

$$\mathrm{v} = \frac{\mathrm{b} \cdot (\mathrm{Po} - \mathrm{P})}{\mathrm{P} + \mathrm{a}} \tag{5}$$

SBML2LaTeX was developed by Andreas Dräger[a], Hannes Planatscher[a], Dieudonné M Wouamba[a], Adrian Schröder[a], Michael Hucka[b], Lukas Endler[c], Martin Golebiewski[d] and Andreas Zell[a]. Please see http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX for more information.

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