Recklinghausen

BIO PROZESSTECHNIK

Messen- und Regeln in der Biotechnologie

Übung_001: Kinetik (BM)
004_001

Westfälische Hochschule

- Standort Recklinghausen-

Sommersemester 2016

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BERKELEY MADONNA
Modeling and Analysis of Dynamic Systems

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$\frac{dx_i}{dt} = f_i(x_1,...,x_n,t),\ i = 1,...,n$

Solve Differential Equations in Milliseconds!

Berkeley Madonna is arguably the fastest, most convenient, general purpose differential equation solver available today. It is relatively inexpensive and runs on both Windows and Mac OS. Developed on the Berkeley campus under the sponsorship of NSF and NIH, it is currently used by academic and commercial institutions for constructing mathematical models for research and teaching.

Latest Version: 8.3.18

Error in documentation for normal random number syntax

The correct syntax for generating a random number y with a normal distribution is y = normal(μ, sd) where μ is the mean and sd is the standard deviation. Older versions of the Equation Help menu as well as the User's Guide erroneously stated that the second argument was the variance. This has been corrected in both Equation Help and User's Guide as of 1/13/2010

What's going on with Berkeley Madonna

The compute engine of Berkeley Madonna was originally written in C, and later extended with the Flowchart graphical interface written in Java. Because of changes in Apple's Java implementation in OS X, it has been difficult to retain the same architecture on the Macintosh as in Windows.

A version of Berkeley Madonna, called JMadonna, is in development. It will have the user interface written in Java, while retaining the simulation engine in C for speed. This will allow us to extend Berkeley Madonna in many ways, including a Linux version. Before JMadonna is released, however, we are releasing an interim version of Madonna (8.3) for Windows and Macintosh with support for global variables in the Flowchart, nullclines on the phase plane (see below),as well as an improved Fourier transform, an improved pulse function and a more efficient web-based registration through Kagi.

The PC version works well in most versions of Windows. The Flowchart in the Mac version, however, works only in OS 10.4 (Tiger). The equation-only version works in all versions of OS X.

Globals: Flowchart - Equation Window Hybridization

A "globals" dialog has been added which allows you to add equation definitions directly into the equation window without having to create flow chart icons. (Windows and Mac). These definitions are globally

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Einleitung

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DOWNLOAD

You are welcome to download **Berkeley Madonna™** and try it out for no charge. The software is fully functional with the following exceptions:

- Models cannot be saved.
- Graphs and tables cannot be saved or copied.
- A watermark appears in all printouts.
- The *Register* dialog appears each time the program is started.

Einschränkungen

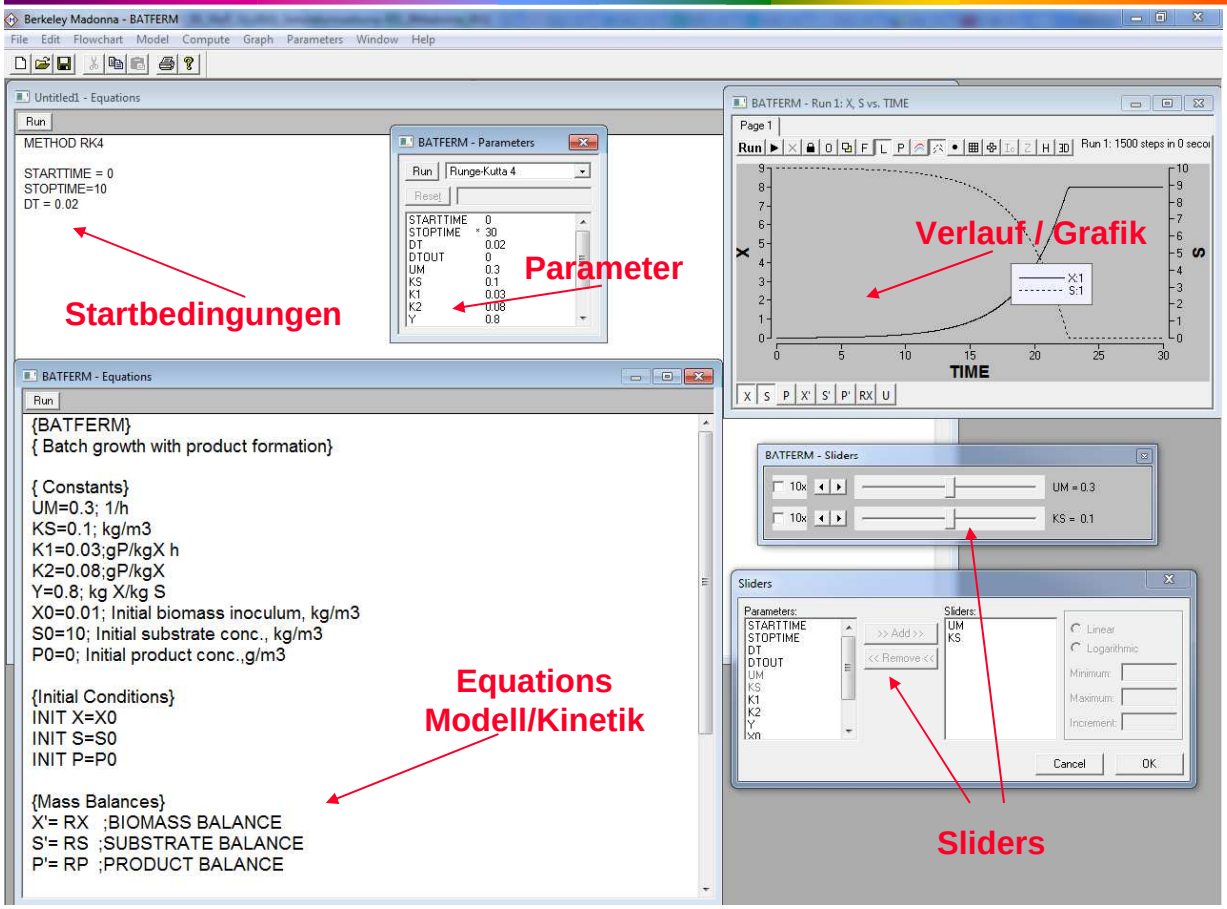
When you purchase a Berkeley Madonna license, we'll send you a registration number which removes these restrictions. We'll also send you a copy of the *Berkeley Madonna User's Guide* in Adobe Acrobat format.

For complete instructions on purchasing a Berkeley Madonna license, refer to the *Read Me* file in the download package or the How to Purchase page.

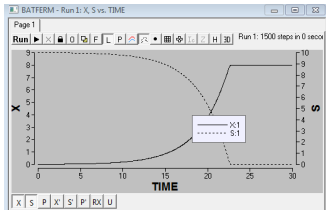
Macintosh	Windows
Berkeley Madonna for Macintosh runs on Apple Power Macintosh and 100% compatible computers with a PowerPC CPU (601, 604, G3, etc). It will also run on the new Intel-based Macintoshs under the Rosetta emulator. Older machines with 68K CPUs are not supported. 1. Download **Berkeley Madonna 8.3.18 for Macintosh (beta)**. 2. Run the installer by double-clicking the **Berkeley Madonna Installer** icon. 3. If you want to use the Flowchart Editor, ensure that MRJ (Macintosh Runtime for Java) or later is installed on your system. You can download the latest version of MRJ from Apple Computer via Software Update. If you are having trouble starting the Flowchart Editor on **OSX 10.6.x Snow Leopard**, please run the Java Preferences app (found in Applications/Utilities) and drag [Java SE 6 32-bit] to the top of the Java Applications list.	Berkeley Madonna for Windows runs on personal computers with Intel x86 or compatible processors under Microsoft Windows 95, Windows 98, Windows NT 4.0, Windows XP, and later versions of these operating systems. 1. Download **Berkeley Madonna 8.3.18 for Windows**. 2. Run the installer by double-clicking the downloaded file). 3. Read this information about running this version under Windows Vista or Windows 7.

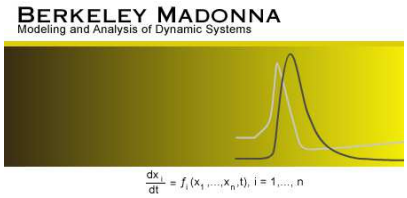
download the beta version of Berkeley Madonna version 9. This version includes a new tiled user interface. Push

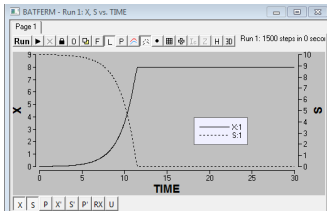
Einleitung



Aufgabe







1. Laden Sie den Madonna-File: BATFERM.mmd ein
2. Simulieren Sie damit eine Batch-Fermentation
3. Variieren Sie die Paramter: KS und UM
4. Erstellen Sie einen Screenshot des Verlaufes mit unterschiedlichen KS und UM-Werten
5. Diskuskutieren Sie die Ergebnisse (kurz !)

6. Erstellen Sie auf der Grundlage von BATFERM.mmd die Simulation

a) einer Fedbatch- Fermentation und b) einer kontinuierlichen Chemostat-Fermentation

7. Fertigen Sie jeweils für a) und b) einen Screenshot des **Equations** und des **Verlaufes** an
8. Diskutieren Sie die Ergebnisse (kurz !)

Umsetzung

1. Übung:

Datum:	**27. 04.15**
Inhalt:	**Fermentationskinetiken und Modellbildung**
Tool:	**Berkeley Madonna (eingeschränkte Version)**
Download:	**http://www.berkeleymadonna.com/**
Voraussetzung:	**Installation auf einem System (Notebook) aus Gruppe**
Ergebnis:	**1.Screenshot Modellbildung 2.Screenshot Simulationsverlauf (grafisch)**
Darstellung:	**Kurze Ergebnisdarstellung**