

▪ Excel Component

- Excel is among most commonly used engineering tools. Seamless and meaningful integration of Mathcad and Excel allows engineers to use Mathcad where Mathcad is a better tool for the job, while still leveraging benefits of Excel where it makes sense.

▪ 3D Plots

- A picture is worth thousand words (or numbers). Engineers need to visualize 3-dimensional data for better understanding and communication.

▪ Symbolic calculation

- Answers in Engineering are numeric – length of a bridge is 1000ft. However, to derive the right formula that gets us the answer, engineers can manipulate complex equations with the help of Mathcad's symbolic algebra engine.

▪ Performance

- Allow users to better leverage, large memory, multi-core and multi-processor hardware to solve bigger and more complex problems.
- Continued improvements to numeric calculation capability

▪ Collapsible Areas

- Collapsible areas allow engineers to manage large documents by focusing on one part at the time. By collapsing segments of a document, engineers can create clearer presentations by hiding detail and letting the reader focus on important aspects.

Excel Component

Mathcad Prime 2.0

■ Features

- Integrate Excel spreadsheet within Mathcad worksheet
 - Documentation
 - Calculation

■ Benefits

- Leverage existing Excel spreadsheets for calculations
- Enhance readability of worksheets by including data representation in familiar (Excel) form

Inputs							
$excel_{\text{"B2"}} := data$							
run	test 1	test 2	test 3	test 4	test 5	test 6	
1	9.55899832	5.39341502	4.62073832	8.62219531	7.79658314	9.96795644	
2	0.08817101	2.75887234	5.87911718	8.37607619	4.84930583	7.43727675	
3	1.51557162	4.25164882	5.17120055	7.51536424	1.68995889	4.91884263	
4	9.66604101	1.53255531	8.21673036	1.91350644	8.17183693	1.55563474	
5	8.34656833	5.17018523	4.26211691	9.4933842	5.49540588	4.71721648	
6	8.39428639	5.00912175	0.27496173	5.72572342	5.31316957	8.43036705	
7	1.4028116	8.34616332	6.00242529	2.52720473	0.01619293	8.06239398	
8	4.36712706	6.9620637	4.36683118	5.77866594	6.28666998	5.04149262	
9	0.94404227	9.31489515	8.94601136	2.27318391	4.1071173	6.28070194	
10	1.84287655	5.55142366	2.42864653	6.04727127	5.84605447	4.94448254	
11	7.27662452	6.67784927	3.15019812	3.05821958	1.08577546	8.51219003	
MAX	9.66604101	9.31489515	8.94601136	9.4933842	8.17183693	9.96795644	
Outputs							
$V_{max} := \max(excel_{\text{"B2:G12"}})$ $V_{min} := \min(excel_{\text{"B2:G12"}})$							
$V_{max} - V_{min} = 9.952$							

3D Plots

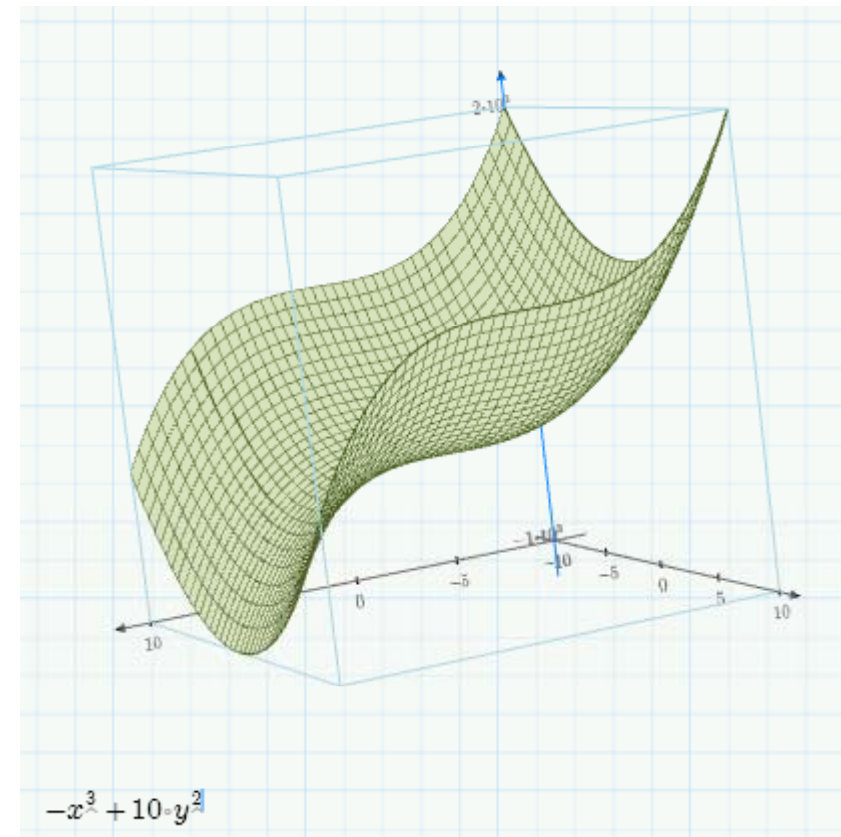
Mathcad Prime 2.0

■ Features

- Surface
- Curve
- Scatter
- Plotting data and functions

■ Benefits

- Get better understanding of 3D data and functions
- Make results easier to understand and interpret by including 3D visualizations



Symbolic Calculation

Mathcad Prime 2.0

■ Features

- Symbolically evaluate expression
- Patented integration between symbolic and numeric calculation
- “Explicit” evaluation

■ Benefits

- Helping engineers derive and simplify equations
- Making calculations easier to review and understand by keeping formula derivations within the document

$$m := 2 \text{ kg} \quad F := 7.1 \text{ N}$$

$$a := \frac{F}{m}$$

$$a \xrightarrow{\text{explicit, ALL}} \frac{7.1 \text{ N}}{2 \text{ kg}}$$

$$a = 3.55 \frac{\text{m}}{\text{s}^2} \quad +$$

$$\int \sin(t) dt \xrightarrow{\text{laplace}} -\frac{s}{s^2 + 1}$$

$$a \cdot x^2 + b \cdot x + c = 0 \xrightarrow{\substack{\text{solve, } x \\ \text{simplify}}} \left[\begin{array}{c} \frac{b + \sqrt{b^2 - 4 \cdot a \cdot c}}{2 \cdot a} \\ \frac{b - \sqrt{b^2 - 4 \cdot a \cdot c}}{2 \cdot a} \end{array} \right]$$

Performance

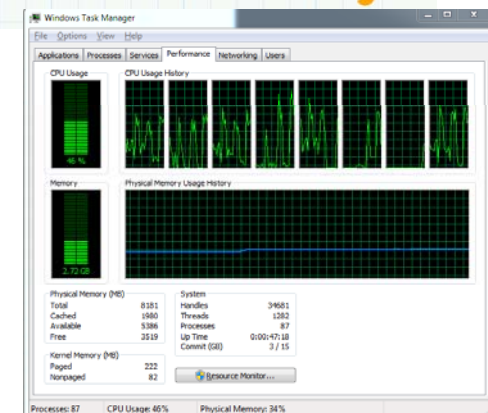
Mathcad Prime 2.0

■ Features

- Native 64bit support
- Leveraging multi-core architecture with the new MKL library for linear algebra
- Support for multi threading
- Improved solver for optimization and non-linear problems

■ Benefits

- Better leverage of investment in hardware
- Ability to solve larger and more complex problems
 - Less need to rely on “programming” solutions that do not offer benefits of Mathcad



Collapsible Areas

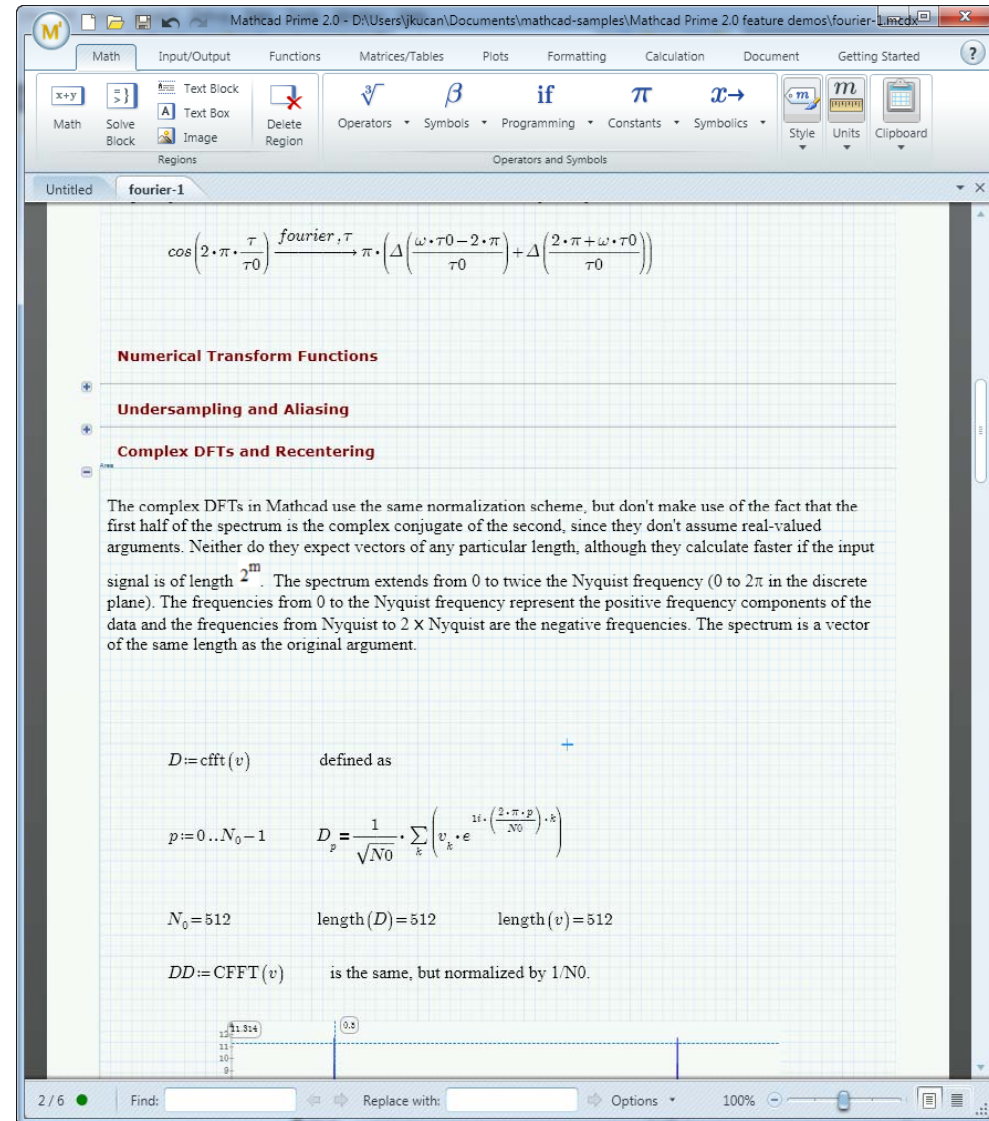
Mathcad Prime 2.0

■ Features

- Place document content within an area
- Collapse and open an area to hide and show content
- Move entire area together

■ Benefits

- Better organization of the document by collapsing areas user is not focused at the moment
- Create better presentation by hiding unnecessary detail
- Protecting sensitive design detail (IP) in the printed document



The screenshot shows the Mathcad Prime 2.0 interface with a document titled "fourier-1". The document content is as follows:

$$\cos\left(2 \cdot \pi \cdot \frac{\tau}{\tau_0}\right) \xrightarrow{\text{fourier}, \tau} \pi \cdot \left(\Delta\left(\frac{\omega \cdot \tau_0 - 2 \cdot \pi}{\tau_0}\right) + \Delta\left(\frac{2 \cdot \pi + \omega \cdot \tau_0}{\tau_0}\right) \right)$$

Numerical Transform Functions

Undersampling and Aliasing

Complex DFTs and Recentering

The complex DFTs in Mathcad use the same normalization scheme, but don't make use of the fact that the first half of the spectrum is the complex conjugate of the second, since they don't assume real-valued arguments. Neither do they expect vectors of any particular length, although they calculate faster if the input signal is of length 2^m . The spectrum extends from 0 to twice the Nyquist frequency (0 to 2π in the discrete plane). The frequencies from 0 to the Nyquist frequency represent the positive frequency components of the data and the frequencies from Nyquist to $2 \times$ Nyquist are the negative frequencies. The spectrum is a vector of the same length as the original argument.

$D := \text{cfft}(v)$ defined as

$$D_p := 0 \dots N_0 - 1 \quad D_p = \frac{1}{\sqrt{N_0}} \cdot \sum_k \left(v_k \cdot e^{1i \cdot \left(\frac{2 \cdot \pi \cdot p}{N_0}\right) \cdot k} \right)$$

$N_0 = 512$ $\text{length}(D) = 512$ $\text{length}(v) = 512$

$DD := \text{CFFT}(v)$ is the same, but normalized by $1/N_0$.

The interface also shows a plot at the bottom with a vertical line at 0.5 and a horizontal line at 11.314.