

What's New in MATLAB for Technical Computing

R2014b - **R2016a**

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Agenda

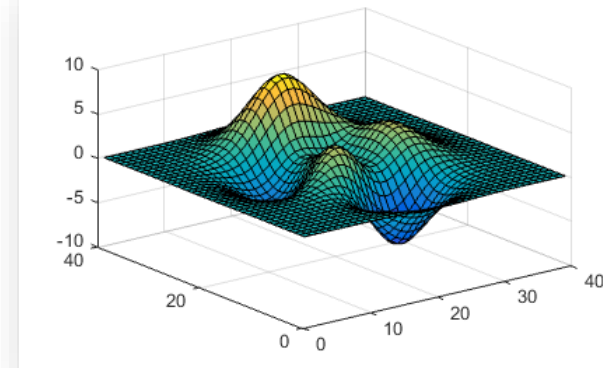
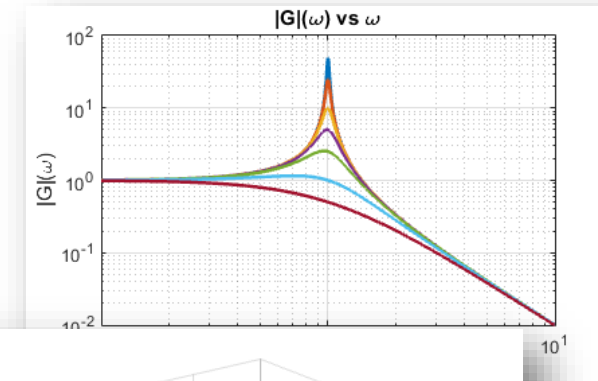
- New MATLAB Graphics System **R2014b**
- App Designer **R2016a**
- New Data Type for Handling Dates **R2014b**
- Redesigned MATLAB Execution Engine **R2015b**
- Live Editor **R2016a**

New Graphics System

- New look
 - New default colormap and line colors
 - Smoother text and lines
 - Subtler grid lines

Data easier to interpret

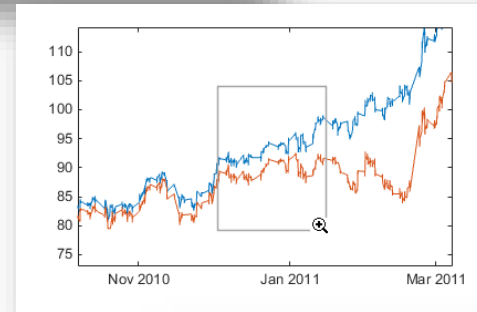
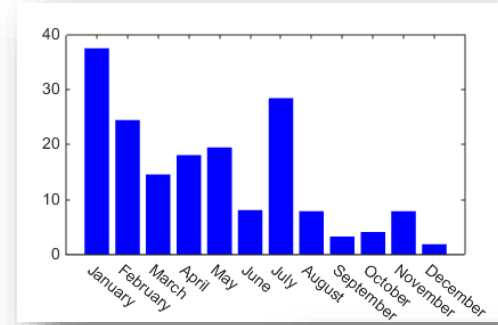
- Easier to customize
 - Graphics objects now behave like other MATLAB objects
 - Support dot-notation to access and change properties



```
>> p = plot(x,y);  
>> p.Color = 'red';
```

New Graphics System Features

- Rotatable tick labels
- Multiple colormaps per figure
- Increased control for customizing plot axes
- Multiple y-axis plots
- User interfaces with tab panels
- Steady stream of new graphics features continuously being added

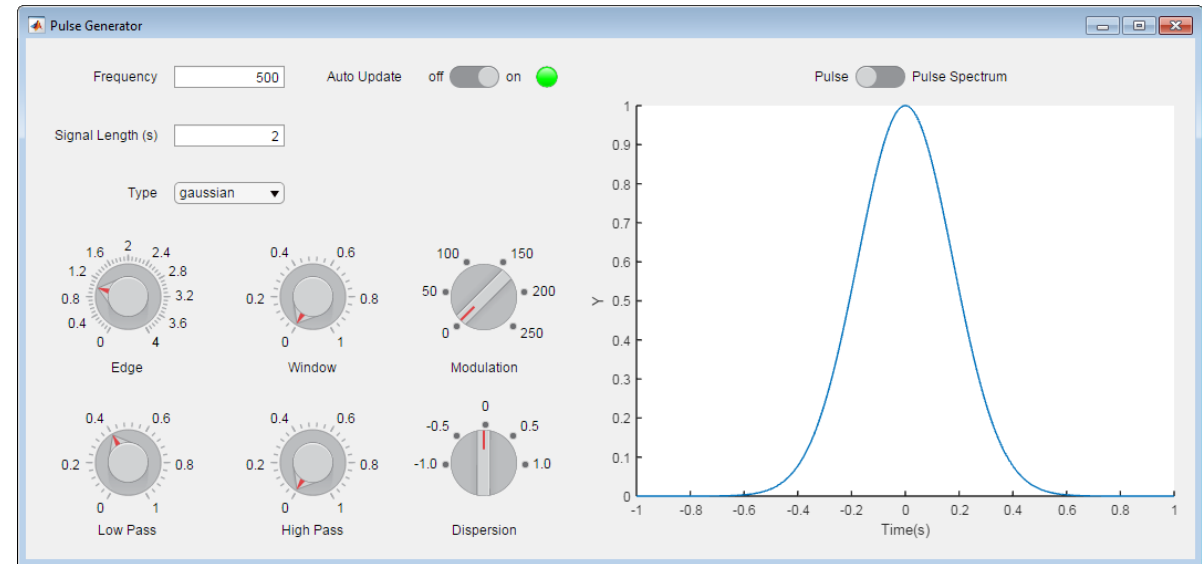


A user interface window titled "User Interfaces with Tab Panels" with three tabs: "Loan Data", "Amortization Table", and "Principal/Interest Plot". The "Loan Data" tab is active, showing four input fields:

Parameter	Value
Loan Amount	400000
Down Payment %	5
Interest Rate %	4.5
Load Period (years)	20

App Designer

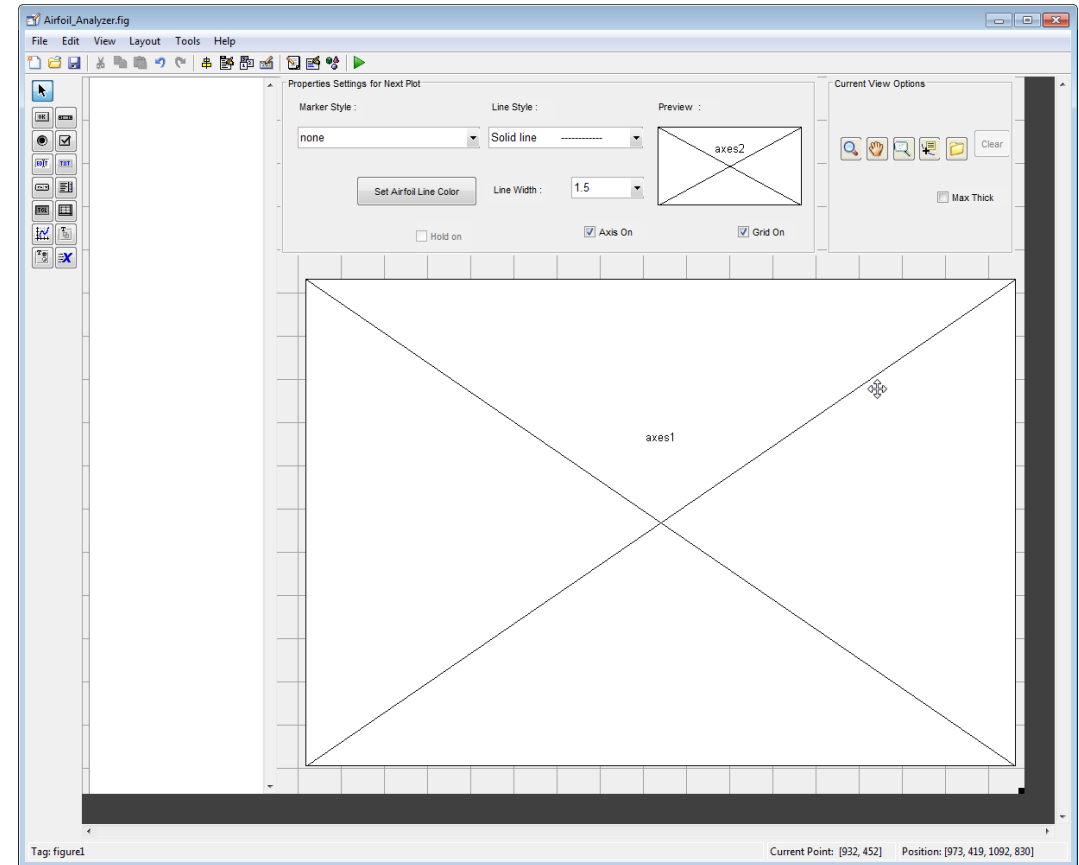
- Enhanced design environment
- Expanded UI component set
- Code integration
 - Tight synchronization of design and code views with embedded editing
 - New object-based code format



Built on Web Technology

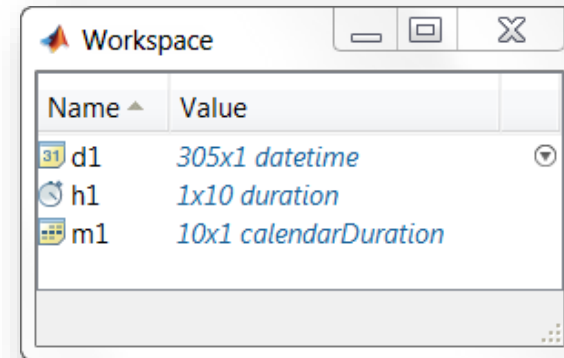
App Designer is Not a Replacement for GUIDE (today)

- Limited graphics support
 - Only 2D line and scatter plots are supported
 - Does not support zoom, pan, rotate
 - Does not support custom interaction through mouse and keyboard callbacks
- Some existing UI components are not supported
 - e.g., components for creating menus, toolbars, or tables

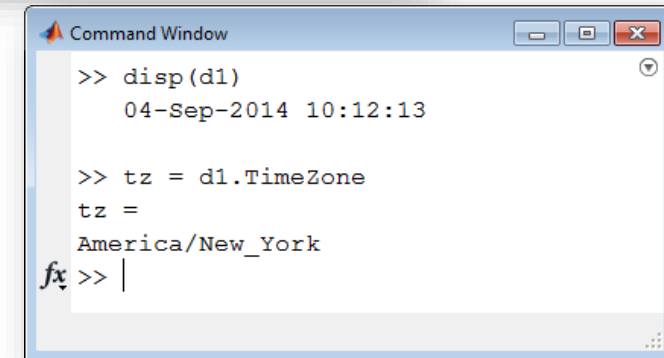


Date and Time Arrays

- `datetime` for representing a point in time
- `duration`, `calendarDuration` for representing elapsed time
- Same data type for computation and display
 - Add, subtract, sort, compare, and plot
 - Customize display formats
 - Nanosecond precision
- Support for time zones
 - Accounts for daylight saving time

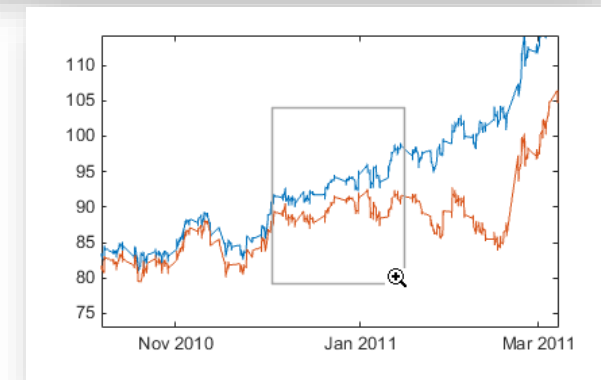


Name	Value
d1	305x1 datetime
h1	1x10 duration
m1	10x1 calendarDuration



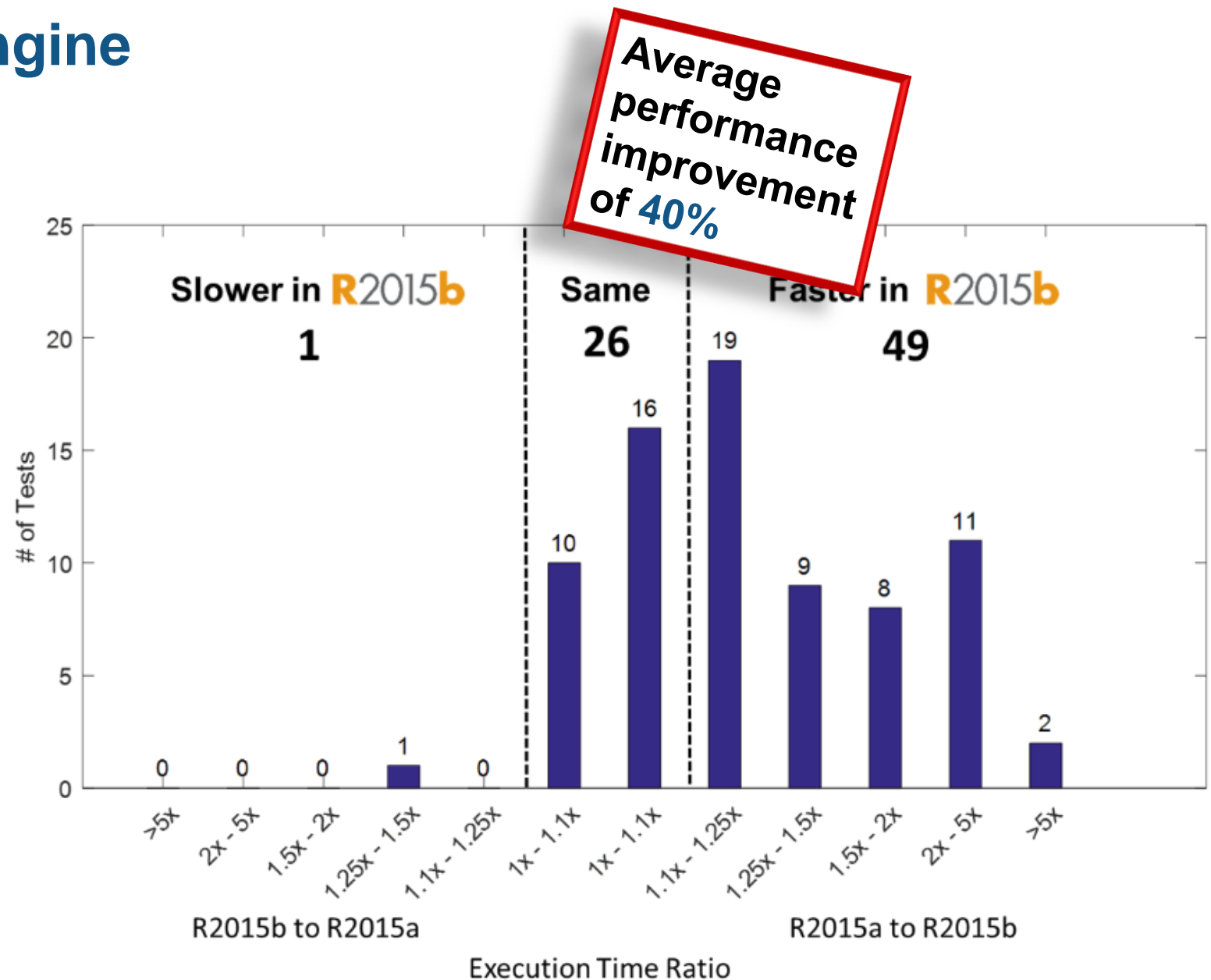
```
>> disp(d1)
04-Sep-2014 10:12:13

>> tz = d1.TimeZone
tz =
America/New_York
fx >> |
```



MATLAB Execution Engine

- Redesigned **execution engine** runs MATLAB code faster
 - All MATLAB code is now JIT compiled
- Function call overhead is lower
- Many object-oriented features are faster



Live Editor

The screenshot displays the MATLAB Live Editor window for a file named 'Sunrise_Sunset.mlx'. The interface includes a toolbar with various editing and execution tools, and a workspace area divided into two panes.

Left Pane (Code Editor):

```
For this example, we will use Boston as our location. We can see how the solar time correction changes over the course of a year.
```

```
long = -71.06;  
lat = 42.36;  
UTCoff = -5;  
  
longCorr = 4*(long - 15*UTCoff)  
days = 1:365;  
B = 360*(days - 81)/365;  
EoTCorr = 9.87*sind(2*B) - 7.53*cosd(B) - 1.5*sind(B);  
solarCorr = longCorr + EoTCorr  
  
clf  
plot(days,solarCorr)  
axis([1 365 0 35])  
title('Solar Time Correction')  
xlabel('Day of Year')  
ylabel('Minutes')
```

Right Pane (Output):

```
longCorr = 15.7600  
solarCorr = 1x365 double  
12.0548 11.6103 11.1706 10.7361 ...
```

Figure:

The figure is a line plot titled "Solar Time Correction". The x-axis is labeled "Day of Year" and ranges from 0 to 365. The y-axis is labeled "Minutes" and ranges from 0 to 35. The plot shows a blue curve representing the solar time correction over the course of a year. The curve starts at approximately 12 minutes at day 0, reaches a minimum of about 1 minute at day 50, a secondary peak of about 20 minutes at day 130, a secondary minimum of about 10 minutes at day 210, and a maximum peak of about 33 minutes at day 300, before ending at approximately 13 minutes at day 365.

Summary

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