## Summary of New Features

The following new items are included in this official release version of FRED 24.10

### New Charting

*The new charting was launched in preview mode in the prior release, but has since been extended to fill in functional gaps to the legacy charts, and as a result is now considered complete.*

The charting in FRED has been modernized to a newer charting technology (LightningChart) with the aim of making charting analyses faster, more responsive, more feature rich and thereby improve overall useability.

Notable usability enhancements include:

- Simple controls in a new Chart Navigator pop-out to set custom max/min chart scaling and increase / decrease text font sizes
- The ability to create Analysis Result Nodes (ARNs) directly from existing charts
- Dynamic rescaling of axes in the charts (via click and drag on the axes)
- The addition of a text "Info window" pop-out that features pertinent information to the chart such as total power and ray counts to avoid having to refer scroll back through the output window
- An optional "Dark Mode" setting

Note that it is possible to revert to the legacy charting at any time by selecting the "Use Legacy Chart" option in Tools... Preferences... Charting. Note that you do not need to restart FRED.

### General Updates

- FRED now supports import of ray files in both IES-TM-25 and LightTools binary formats.
- Support has been added for surface retro-reflection and phase conjugation. These new options are available in the modifiers tab of the surface.
- The Jones matrix coating definition now supports "3D Polarization". Unlike the prior algorithm which generated correct results only in the case of normal incidence, the new method supports skew rays.
- Ray selection filters in FRED have been substantially improved to make working with filters easier:
  - The addition of a comparator argument has allowed a significant reduction in the number of filters presented in the list without reducing functionality.

- o Ray filters now also support parentheses to make it more comfortable to define complex ray selection filters grouped with AND/OR conditions
- o New r-click menu items provide the ability to save and load ray filters, as well as create the scripting language equivalent of a given filter operation (row) or entire filter condition to copy into a script.

- A new ray selection filter for Angle of Incidence / Exitance has been added.
- The single ray trace dialog has been improved to be much more responsive when using a source with a large number of rays
- Color Correlated Temperature (CCT) has been added to the Color Image output and scripting language
- MPC (GPU) traces now print a summary at trace end in a similar manner to CPU traces which lists the number of rays traced and how many rays were terminated for exceeding ray trace control limits.
- MPC now compiles and sends the FRED model to the board faster, and requires fewer recompiles.
- A number of out of box preferences have been updated to make new installations of FRED nicer to work with and allow FRED to use more hardware resources without further user intervention.
- Added full Unicode text support to allow non-English characters to be presented. This improvement will allow FRED to be translated into other languages.
- Added a first translation of FRED to Japanese

## Miscellaneous Updates and Bug Fixes

In addition to the improvements described above, this release contains several smaller features and bug fixes. Please refer to the Release Notes found on the Help menu inside of FRED for a complete listing of all enhancements and defect resolutions.