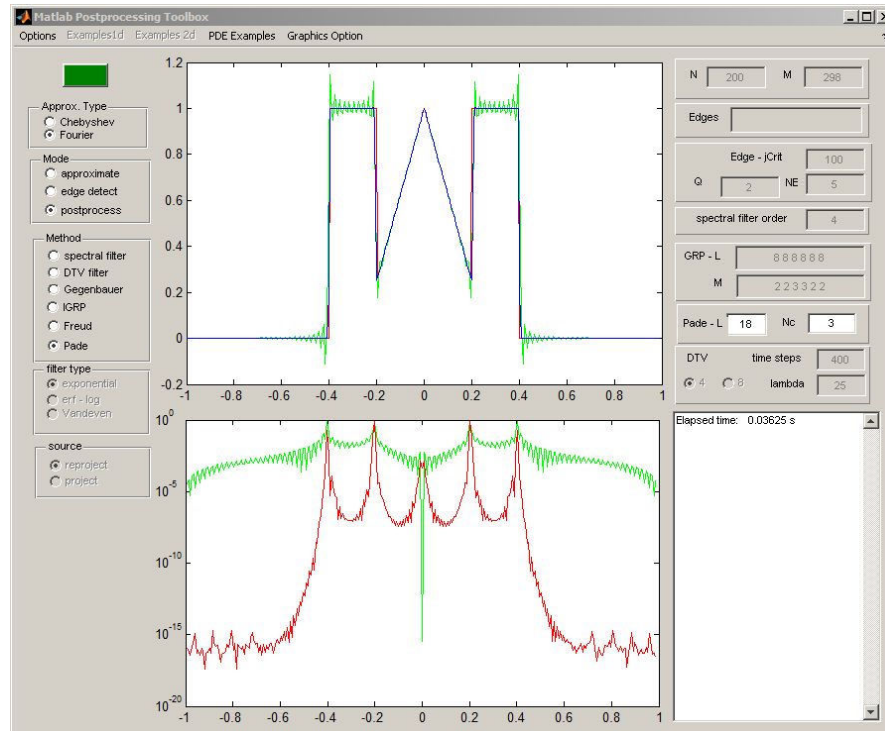


MPT GUI guide

One of three modes is active at all times: approximate, edge detect, or postprocess. The available options become enabled in the GUI for each mode.



Approximate

- Select Chebyshev or Fourier approximation.
- The spectral approximation will have $N+1$ terms.
- The spectral approximation will be evaluated on M equally spaced points on $[-1, 1]$.
- Select an example function from the examples1d or examples2d menu. **Warning:** when selecting a 2d function make sure N and M are not too large for your computer.
- When a selection is made from the PDE Examples $N=M$ is automatically set.
- If N , M , or Approx. type is changed the function must be selected from an examples menu in order for the change to take place.

Edge Detect

The location of discontinuities can be marked in three ways:

- Manual Edges. From the Options menu choose manual edges. A cross hair will appear over the graph of the spectral approximation. Left mouse click to add edge locations. Right click on the final edge to end the selection process. Edges at $x=-1$ and $x=1$ are automatically added and do not need to be selected. The selected edges will appear in the text box in the lower right corner of the GUI.
- Text Edges. Enter edge locations, separated by spaces, in the Edges text box. Edges at $x=-1$ and $x=1$ are automatically added and do not need to be input. Edge locations should be ordered increasingly, e.g. -0.5 0 0.5
- Edge Detection Algorithms with nonlinear enhancement via the Green Button. Press the green button and modify jCrit (J), Q, and NE (eta) as necessary. The raw edge data and enhance appear on the bottom axis. The edge location that are found will appear in the text box in the lower right corner of the GUI.

Postprocess

- spectral filtering. Select filter type: exponential, erf-log, or Vandeven. Change the spectral filter order as desired. Both 1d and 2d. Does not need edge locations. Press green button.
- DTV filter. The number of time steps and fitting parameter lambda may be changed. In 2d a 4 point or 8 point neighborhood can be used. Does not need edge locations. Press green button.
- Gegenbauer. First mark edge locations. Then select L and M in each smooth subinterval. Press green button. An error results if the length of L and M does not match the number of subintervals. Select reproject to use the spectral coefficients and project to use the exact function values to calculate the reprojection coefficients.
- IGRP (Inverse Polynomial Reprojection). First mark edge locations. Then select M in each smooth subinterval. Press green button. An error results if the length of M does not match the number of subintervals. In inverseReprojection the default is $L=0.5$. Modify the m-file to change if desired. Select reproject to use the spectral coefficients and project to use the exact function values to calculate the reprojection coefficients.
- Freud. First mark edge locations. Press green button. L and M will be calculated in frp.m and displayed in the L and M text boxes which are not editable. Select reproject to use the spectral coefficients and project to use the exact function values to calculate the reprojection coefficients.

- Pade. Input the degree of the denominator, L. Enter N_c , the number of spectral coefficient to be disregarded, if desired. Press the green button. Does not use the location of the edges.

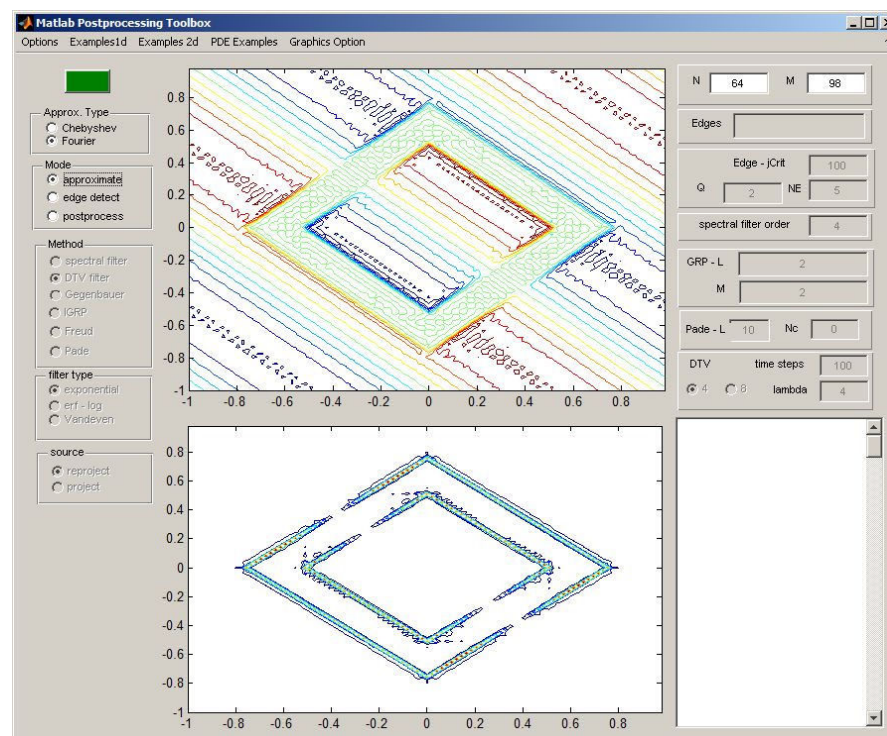
Graphics Options menu

- un check to display legends to stop graphics legends from being displayed.
- 2d example can be viewed either as a surface (default) or contour plot

Options menu

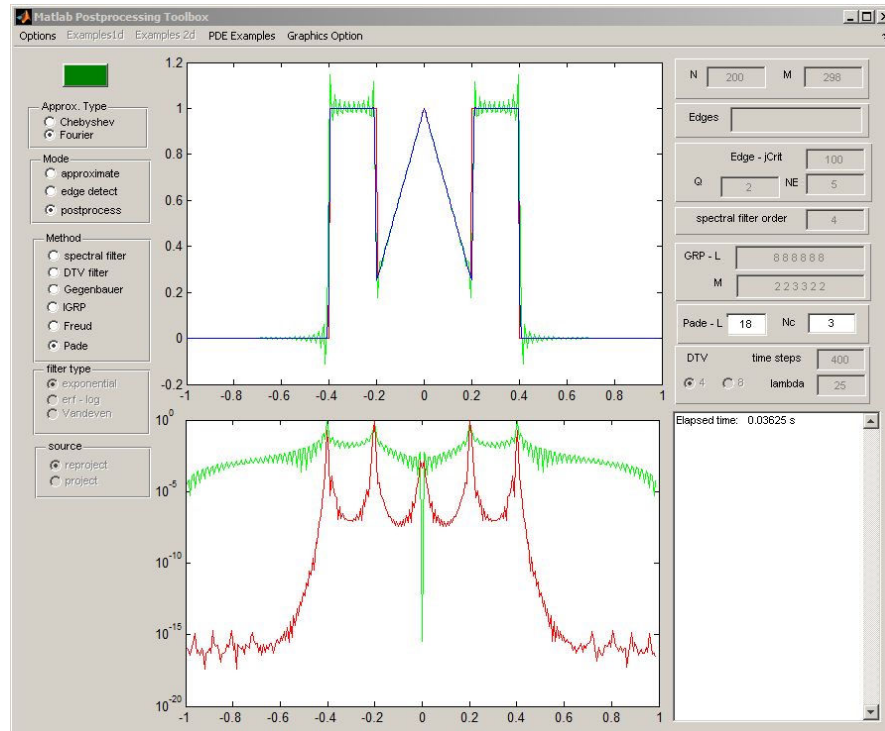
Data can be exported from the GUI to the Matlab workspace:

- pp - the postprocessed approximation
- fa - the spectral approximation
- x - the grid the postprocessed approximation is evaluated on
- f - the exact function on grid



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