

(24Sep24) mc_inverse.m and mc_inverse.Win.m bug fixes and code cleanup with solutions using lsqcurvefit
 Previous study done 210612 which compared lsqcurvefit with fminsearch:

Since then modifications made:

- SpectralDictionary.xlsx updated by expanding spectral range
- MATLAB version now 2023b, prior 2021b(?) so lsqcurvefit methods might have changed

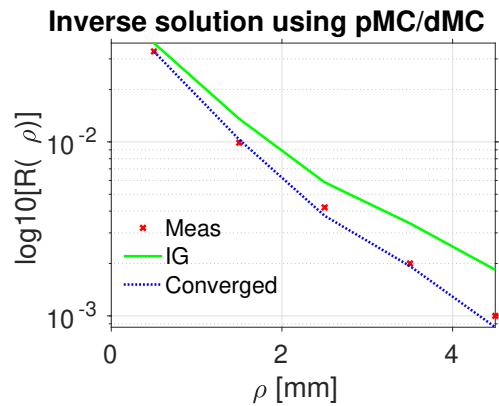
Example 1: N=1000

R(rho) inverse with 6 rho, same as Example 7 in vts_mc_demo.m

- On 210612 lsqcurvefit results:

```

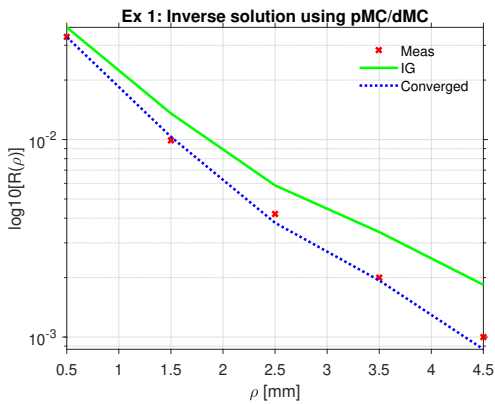
Meas = [0.040000 0.950]
IG = [0.010000 5.000] Chi2=3.387e-05
Conv = [0.052902 5.138] Chi2=3.806e-07
error= [0.322542 4.409]
  
```



- On 240924 results:

```

Meas = [0.040000 4.750]
IG = [0.010000 5.000] Chi2=3.387e-05
Conv = [0.052399 5.113] Chi2=3.777e-07
error= [0.309982 0.076]
  
```



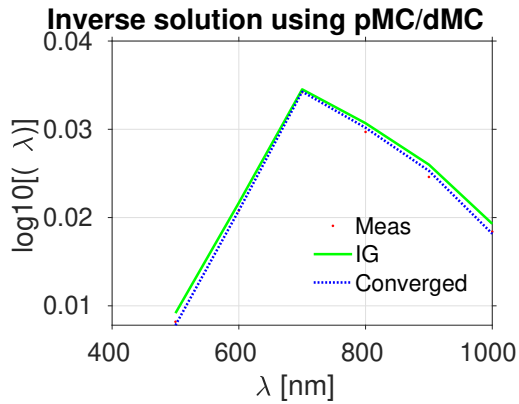
Linux produces exactly same results

Example 2: N=10000

R(rho,wavelength) inverse solution for chromophore concentrations (HbO2, Hb, H2O) using 6 wavelengths and single rho

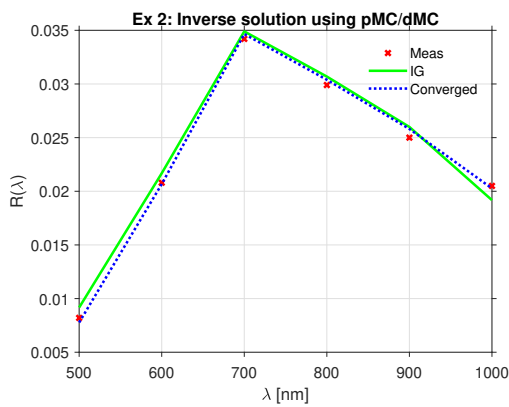
- On 210612 lsqcurvefit results:

```
Meas = [72.000 35.000 1.200]
IG = [70.000 30.000 0.800] Chi2=5.525e-06
Conv = [82.970 30.679 1.056] Chi2=9.311e-07
error= [0.152 0.123 0.120]
```



- On 240924 results:

```
Meas = [72.000 35.000 0.600]
IG = [70.000 30.000 0.800] Chi2=5.558e-06
Conv = [82.625 31.420 0.435] Chi2=1.358e-06
error= [0.148 0.102 0.274]
```



Linux produces exactly same results

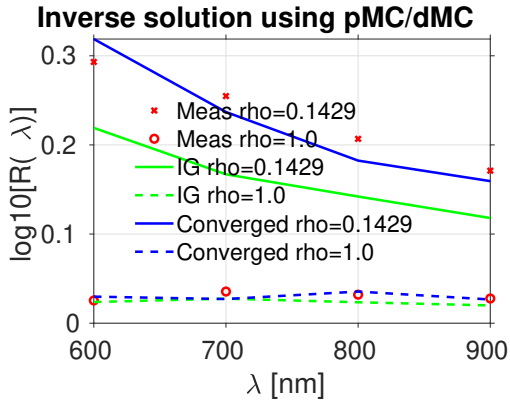
Example 3: N=10000

R(rho,wavelength) inverse solution for chromophore concentrations (HbO2, Hb) and scatterer coefficients (a,b) using 4 wavelgths and single rho

- On 210612 lsqcurvefit results:

```

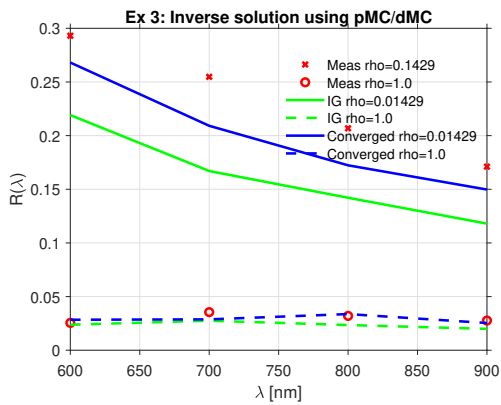
Meas = [28.400 22.400 1.200 1.420]
IG = [18.000 30.000 0.800 1.600] Chi2=2.038e-02
Conv = [18.075 30.005 1.021 1.652] Chi2=1.814e-03
error= [0.364 0.340 0.149 0.164]
    
```



- On 240924 results

```

Meas = [28.400 22.400 1.200 1.420]
IG = [18.000 30.000 0.800 1.600] Chi2=2.038e-02
Conv = [17.928 29.979 0.989 1.496] Chi2=4.414e-03
error= [0.369 0.338 0.176 0.054]
    
```



Linux produces exactly same results