

FOR MORE INFORMATION ON USING MBPE FOR ASSESSING DATA ERRORS AND UNCERTAINTY SEE:

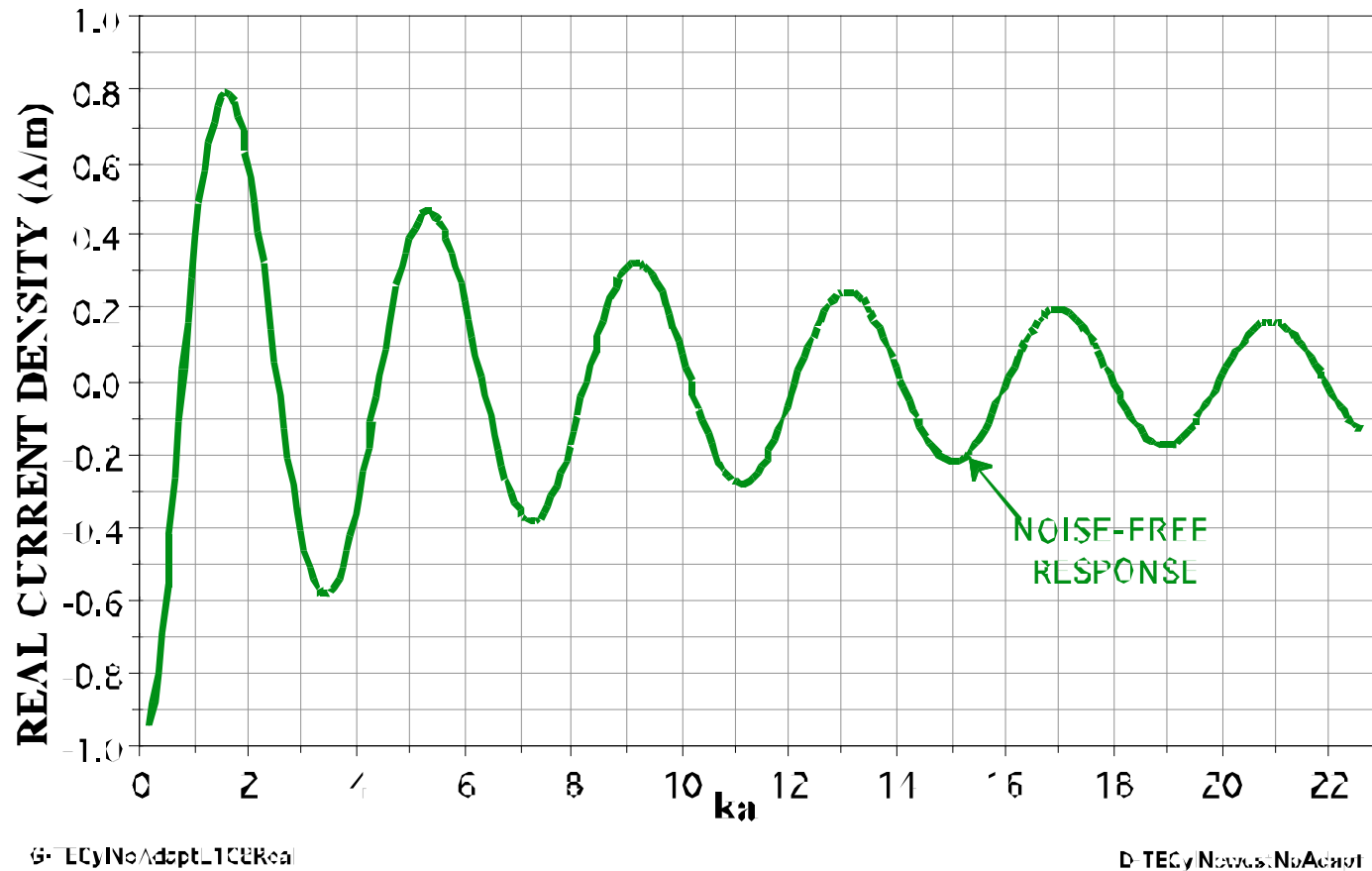
E. K. Miller (1999), “Developing Adaptive Models and Estimating the Uncertainty of Presampled Spectral Data, in *Proceedings of 15th Annual Review of Progress in Applied Computational Electromagnetics*, Naval Postgraduate School, Monterey, CA, pp. 278-285.

E. K. Miller (2002), “Using Adaptive Estimation to Minimize the Number of Samples Needed to Develop a Radiation or Scattering Pattern to a Specified Uncertainty,” *Applied Computational Electromagnetics Society Journal*, Vol. 17, No. 3, pp. 176-186.

MODEL-BASED PARAMETER ESTIMATION OFFERS ONE WAY TO OBTAIN REALISTIC ERROR ESTIMATES OF DATA . . .

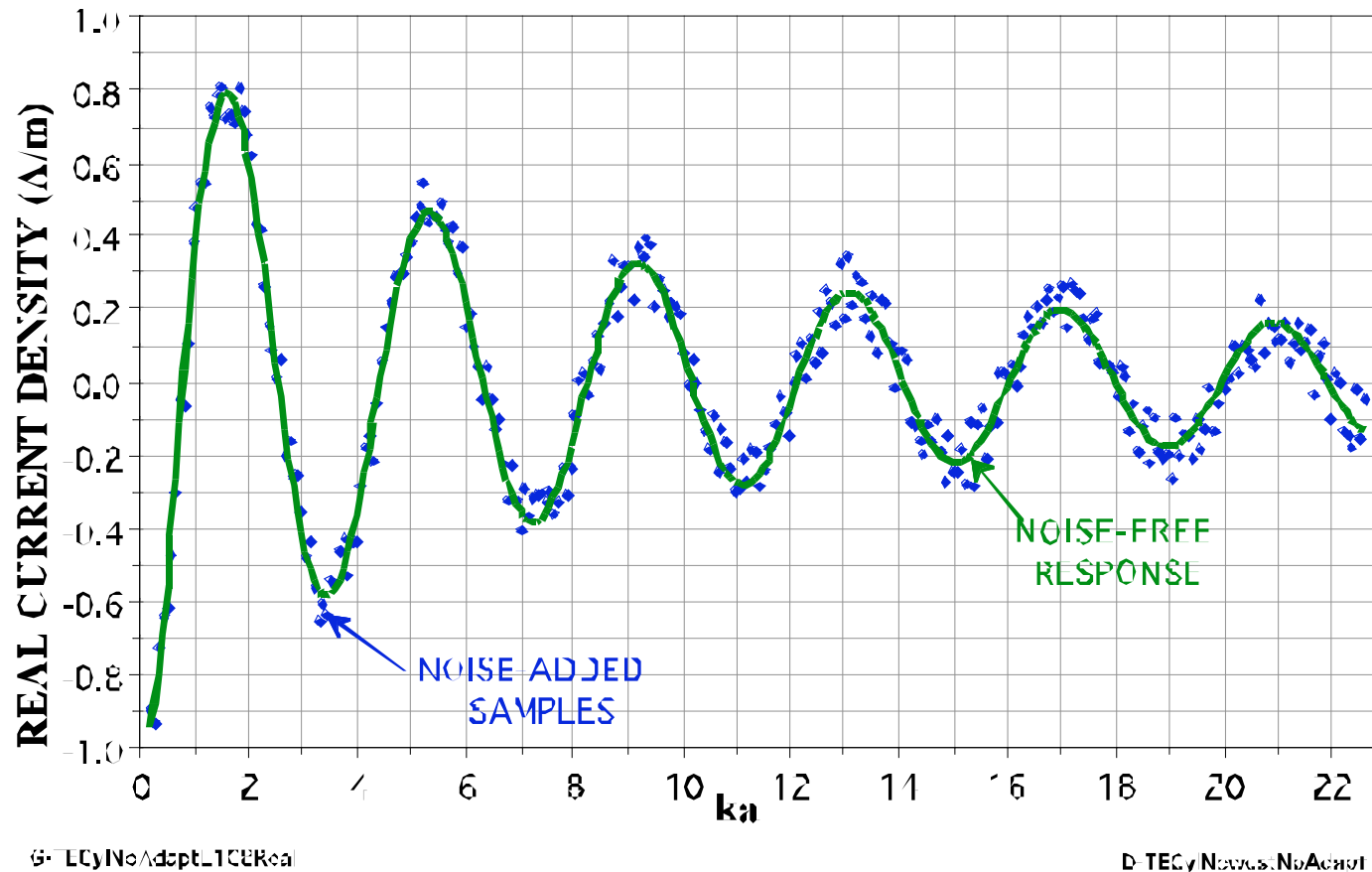
- WHETHER FROM ANALYSIS, MEASUREMENT OR
COMPUTATION

MBPE YIELDS ESTIMATE FOR THE UNCERTAINTY OF COMPUTED RESULTS



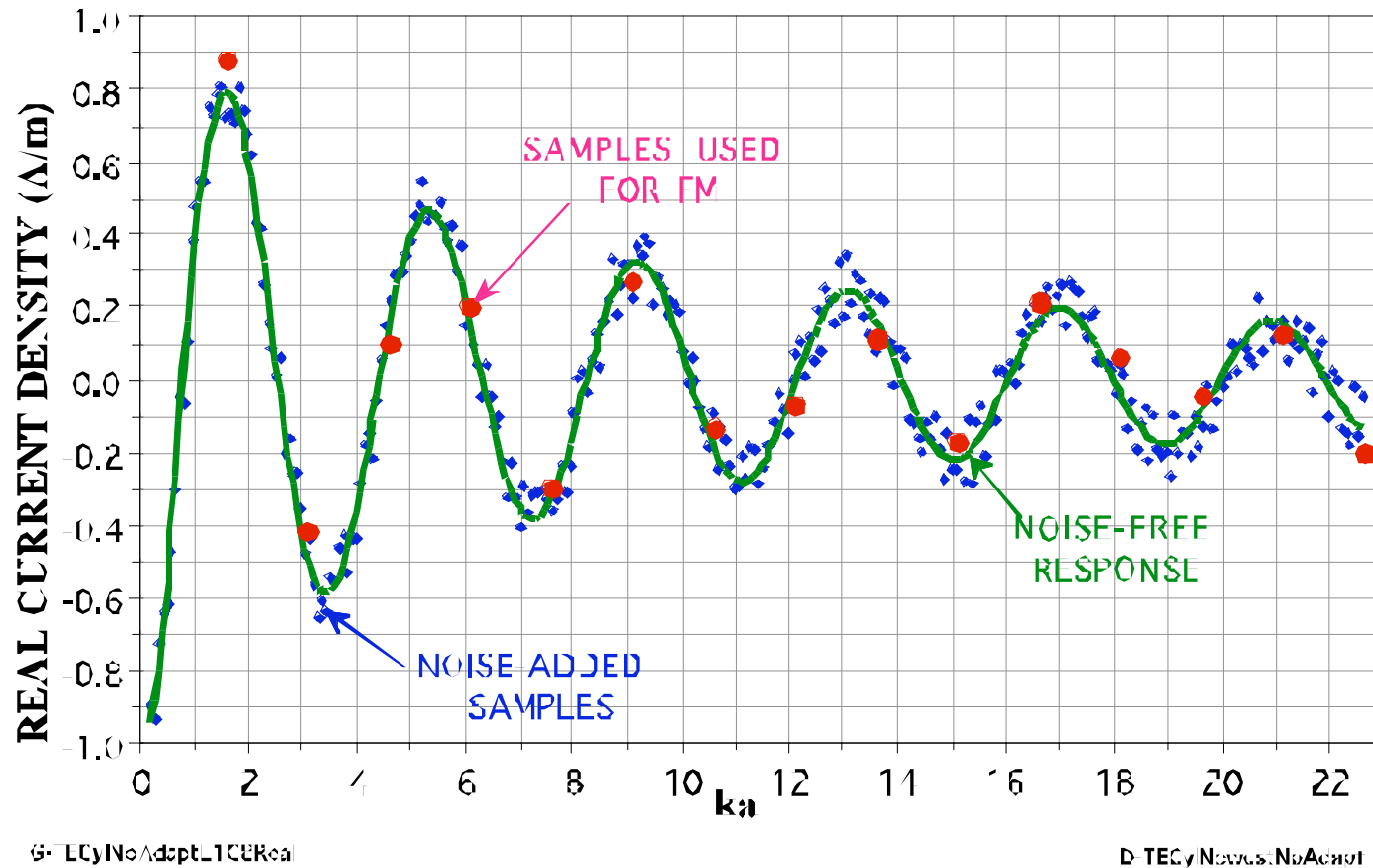
Shown here is the current on the front side of an infinite PEC cylinder illuminated by a TE, normally incident plane wave.

MBPE YIELDS ESTIMATE FOR THE UNCERTAINTY OF COMPUTED RESULTS



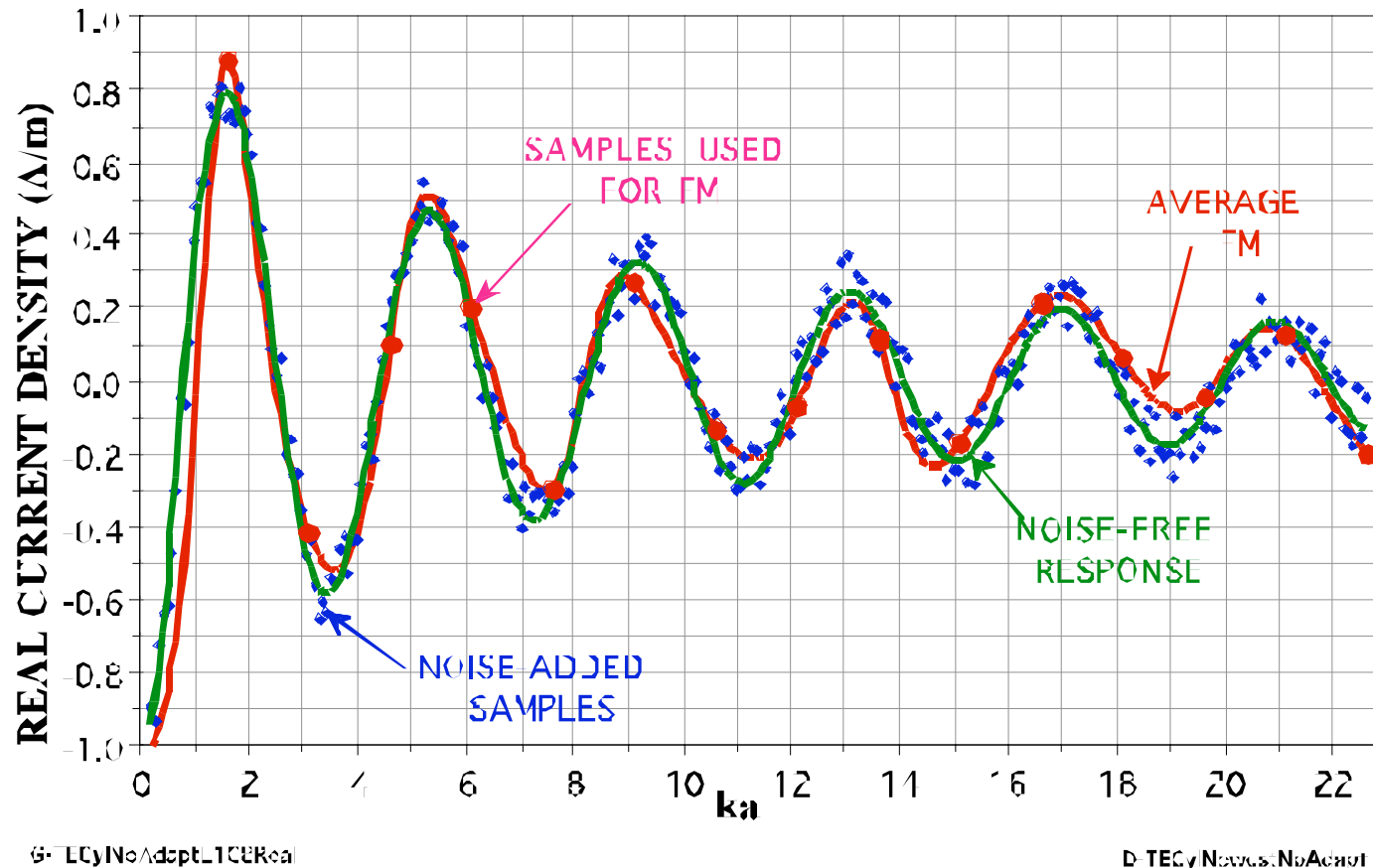
Shown here is the current on the front side of an infinite PEC cylinder illuminated by a TE, normally incident plane wave. The noisy data (the solid circles) comes from adding uniformly distributed random noise varying between ± 0.1 to accurate current samples.

MBPE YIELDS ESTIMATE FOR THE UNCERTAINTY OF COMPUTED RESULTS



Shown here is the current on the front side of an infinite PEC cylinder illuminated by a TE, normally incident plane wave. The noisy data (the solid circles) comes from adding uniformly distributed random noise varying between ± 0.1 to accurate current samples. The solid larger circles are the samples used for computing 5 overlapping fitting models.

MBPE YIELDS ESTIMATE FOR THE UNCERTAINTY OF COMPUTED RESULTS



Shown here is the current on the front side of an infinite PEC cylinder illuminated by a TE, normally incident plane wave. The noisy data (the solid circles) comes from adding uniformly distributed random noise varying between ± 0.1 to accurate current samples. The solid larger circles are the samples used for computing 5 overlapping fitting models. These overlapping fitting models produce the average shown in this final plot with an RMS error of 0.12 with the noise-free response.

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FITTING MODEL

--SERIES COMPUTATION TERMINATED WHEN

$$|T(i)/Sum(i)| < 10^{-L}$$

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RESULTS THAT FOLLOW IS FOUND TO BE ABOUT 8
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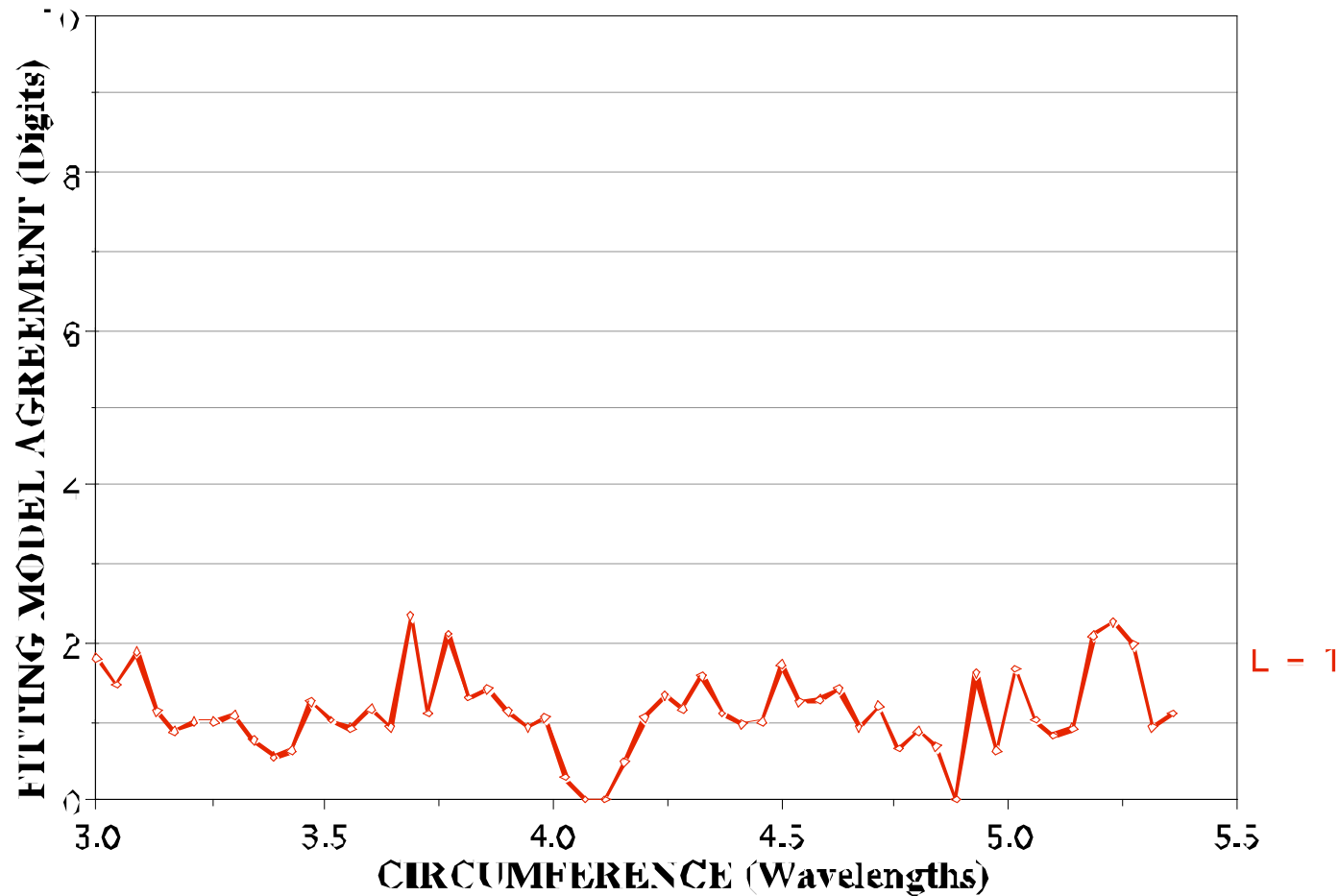
$$|T(i)/Sum(i)| < 10^{-L}$$

--MAXIMUM DETECTABLE UNCERTAINTY FOR THE
RESULTS THAT FOLLOW IS FOUND TO BE ABOUT 8
DIGITS

--OBSERVE THAT ADDITIONAL DATA IS REQUIRED
BEYOND THAT NEEDED TO DEVELOP A FITTING
MODEL TO ESTIMATE THE DATA UNCERTAINTY OR
ACCURACY

E. K. Miller (1999), "Developing Adaptive Models and Estimating the Uncertainty of Presampled Spectral Data," in *Proceedings of 15th Annual Review of Progress in Applied Computational Electromagnetics*, Naval Postgraduate School, Monterey, CA, pp. 278-285.

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

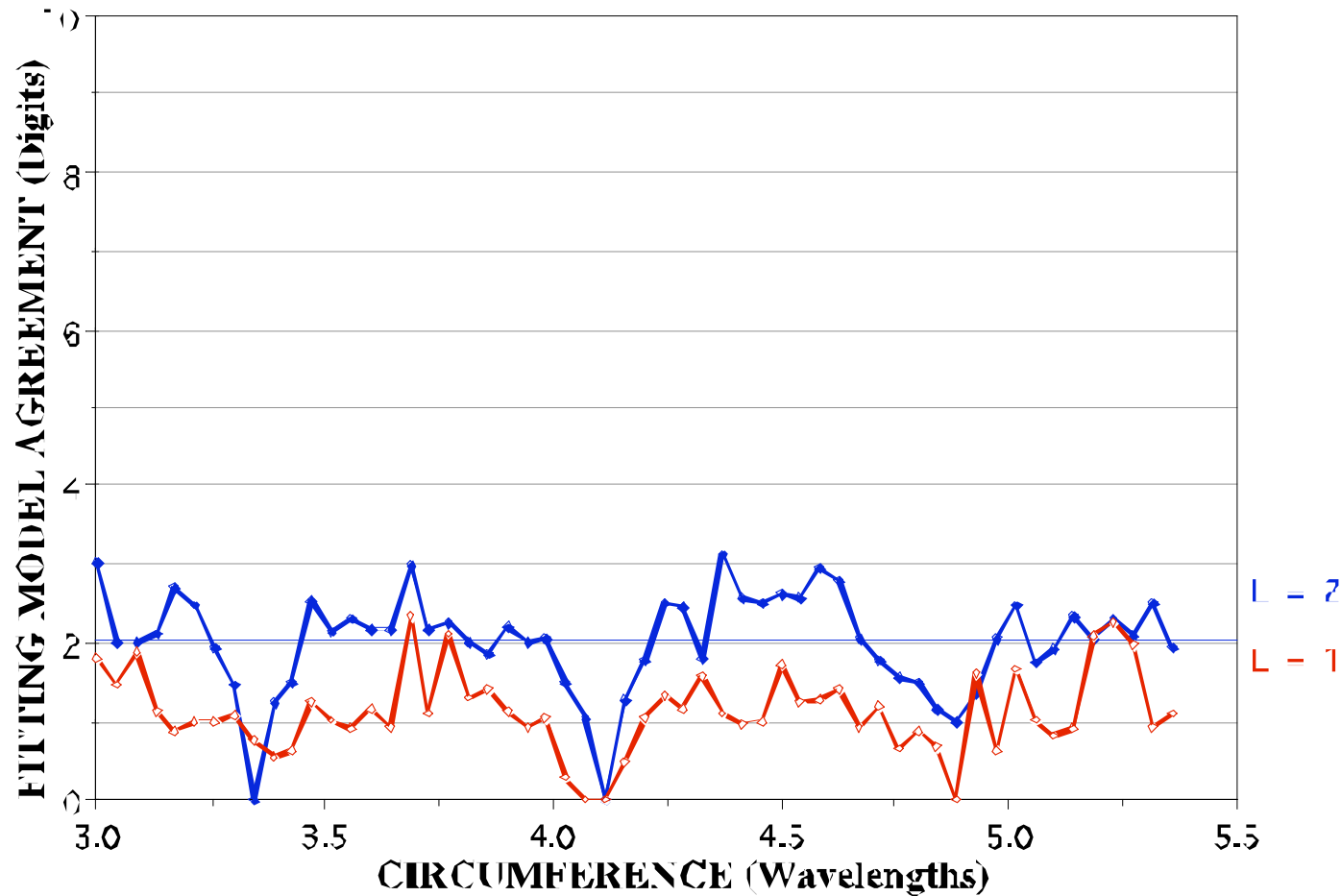


CCD-Cyl,DZ,NZ,DFvarL

C-Cyl,DZ,NZ,DFvarL

$$L = 1$$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

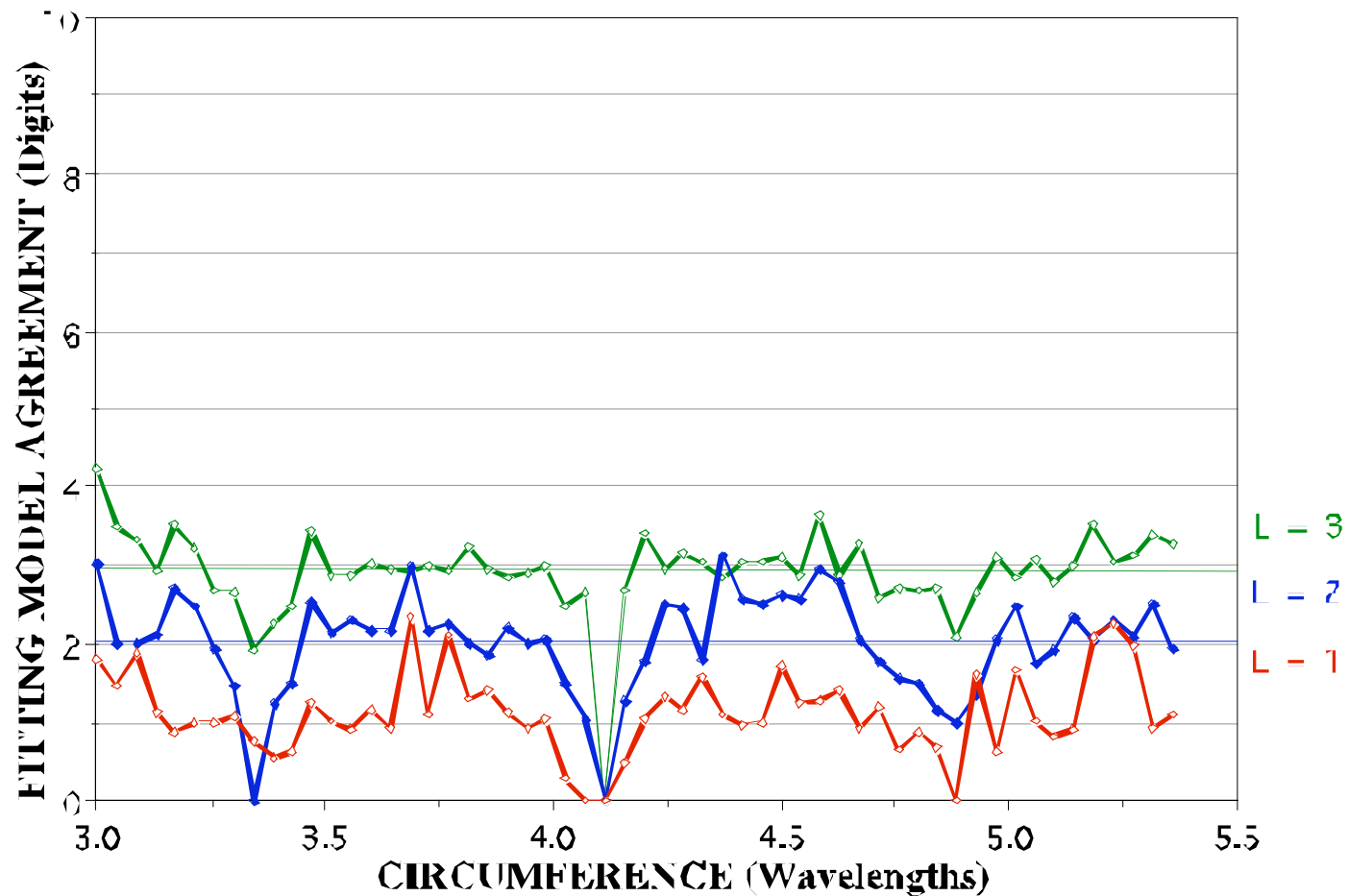


CCD-CyI,DZ,NZ,DFvarL

C-CyI,DZ,NZ,DFvarL

$L = 2$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

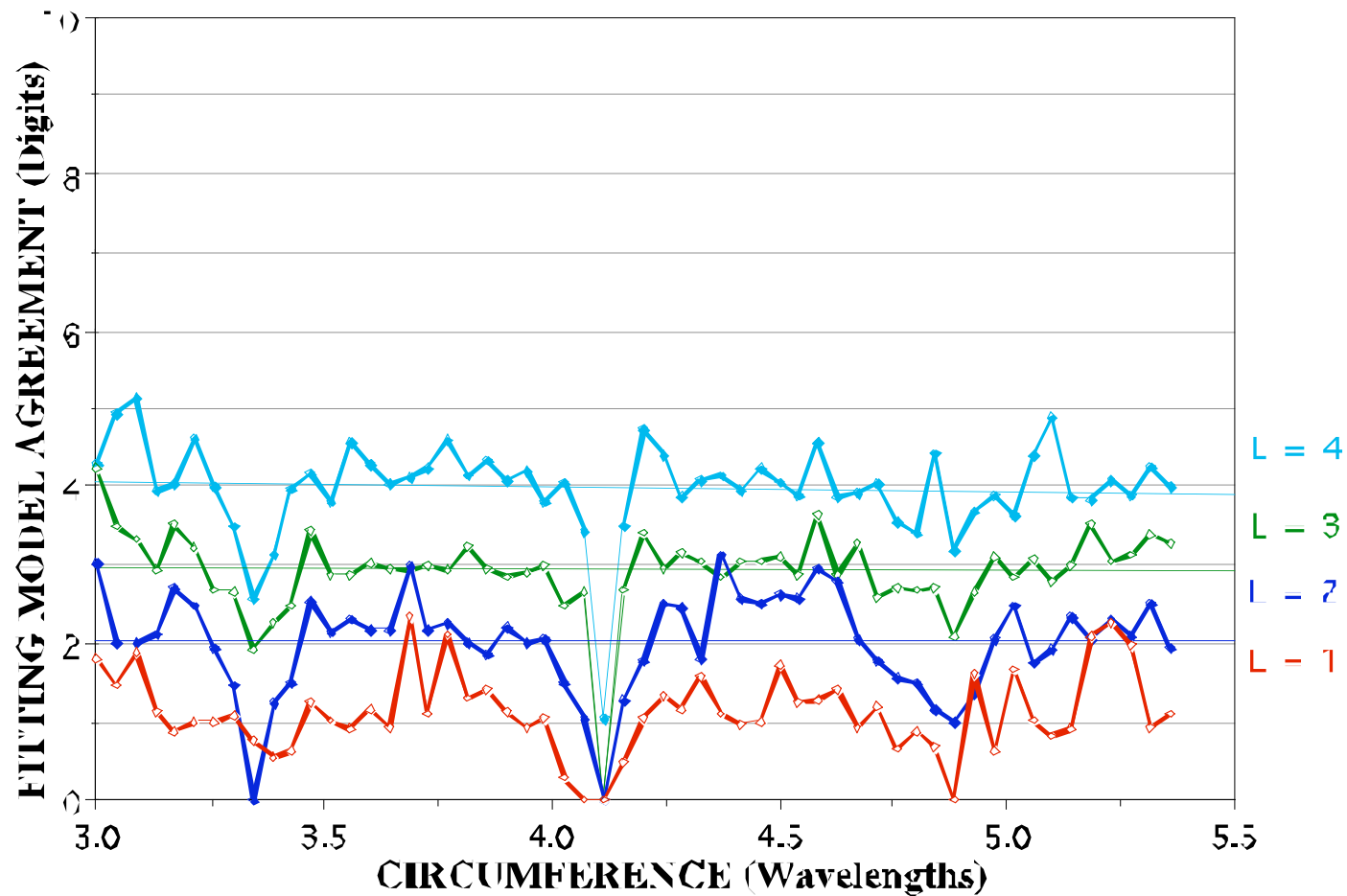


C=Cy|,DZ,NZ,DFvarL

C=Cy|,DZ,NZ,DFvarL

$L = 3$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

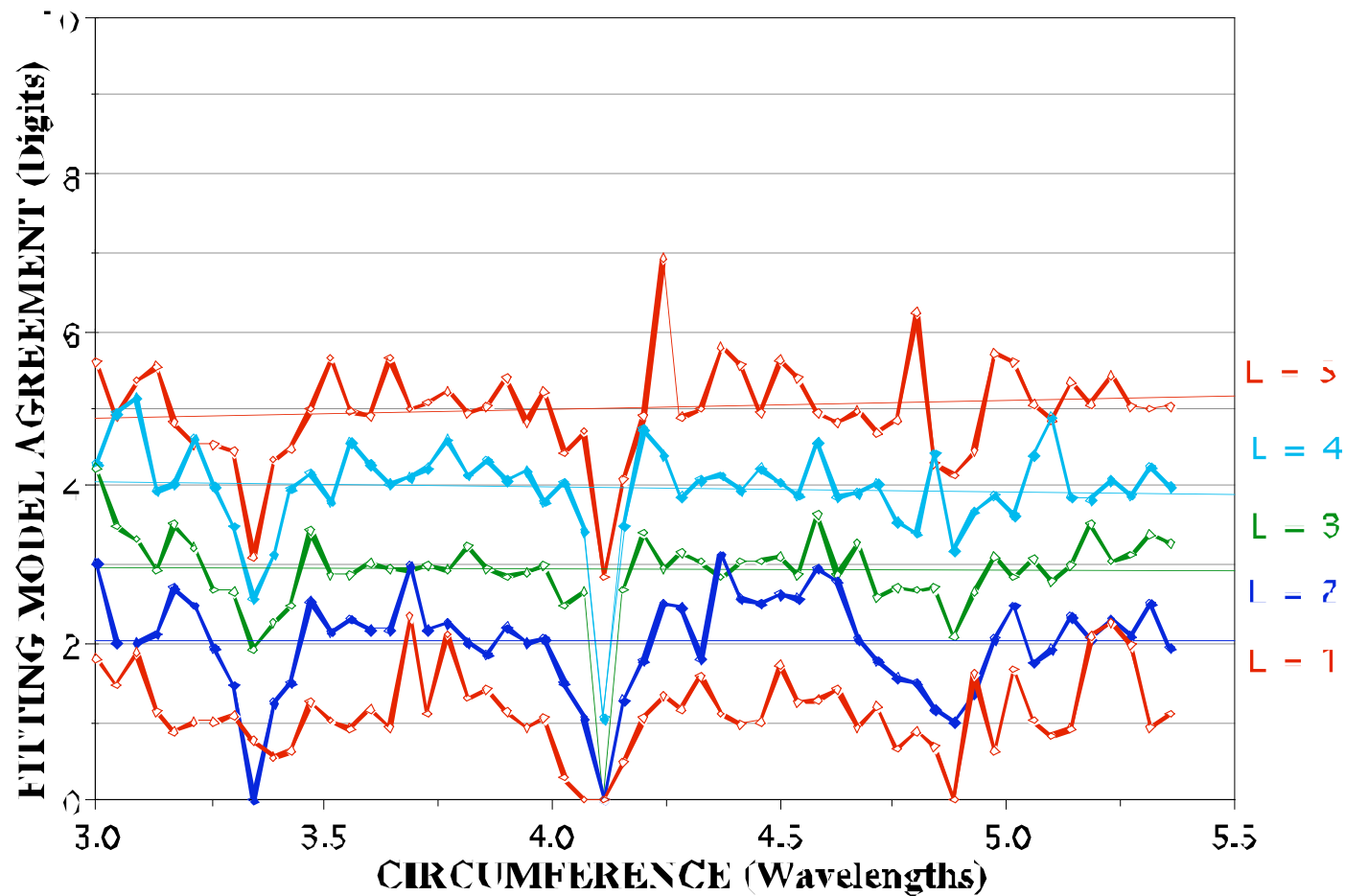


CCD-CyI,D7,N7,DFvarL

C-CyI,D7,N7,DFvarL

L = 4

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

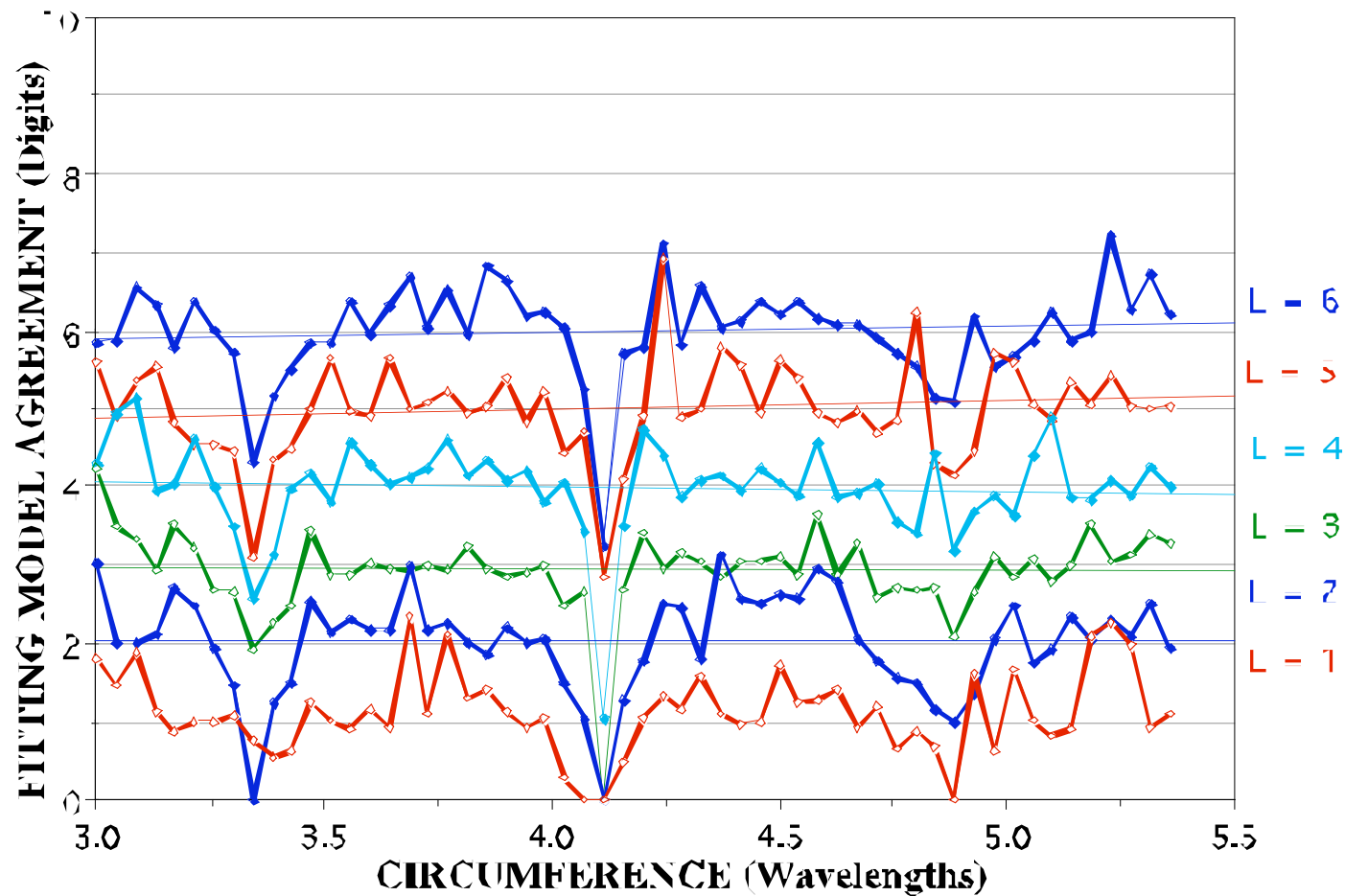


CCD-Cyl,DZ,NZ,DFvarL

C-Cyl,DZ,NZ,DFvarL

$L = 5$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

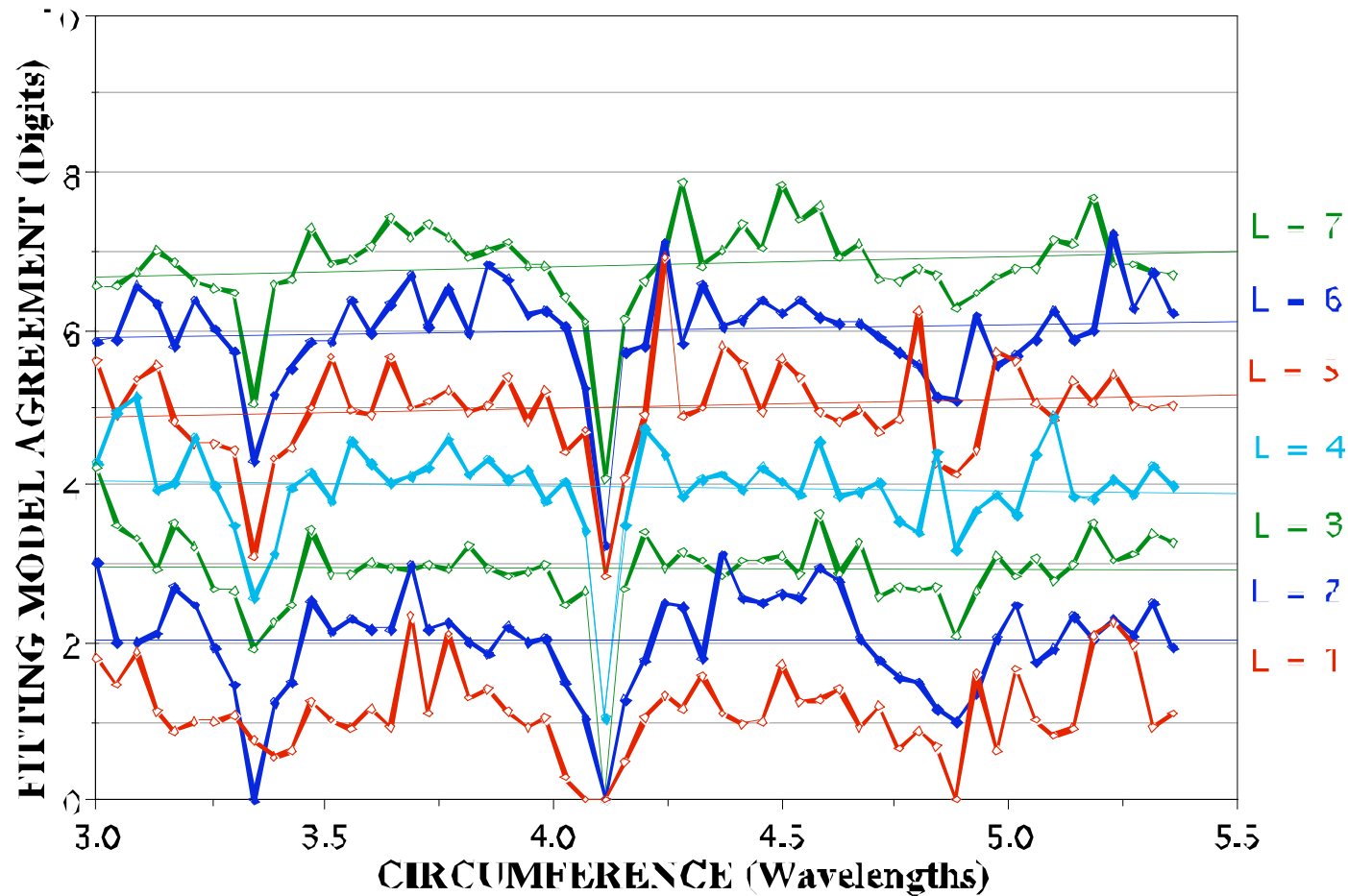


CCD-Cyl,D7,N7,DFvar,L

C-Cyl,D7,N7,DFvar,L

$L = 6$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM

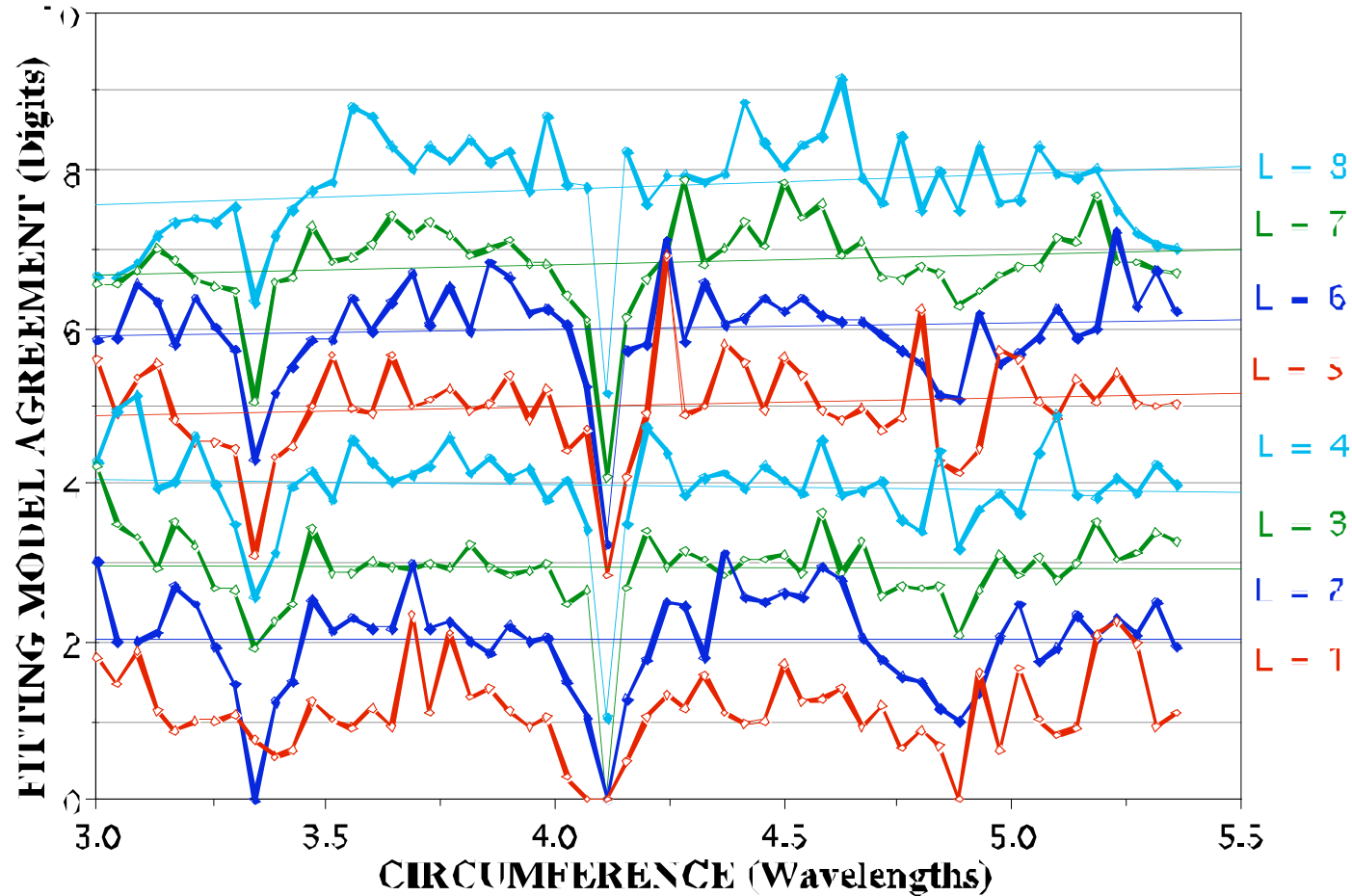


CCD-Cyl,D7,N7,DFvarL

C-Cyl,D7,N7,DFvarL

$L = 7$

CONVERGENCE TEST OF SERIES FOR CURRENT IS REVEALED BY THE FM



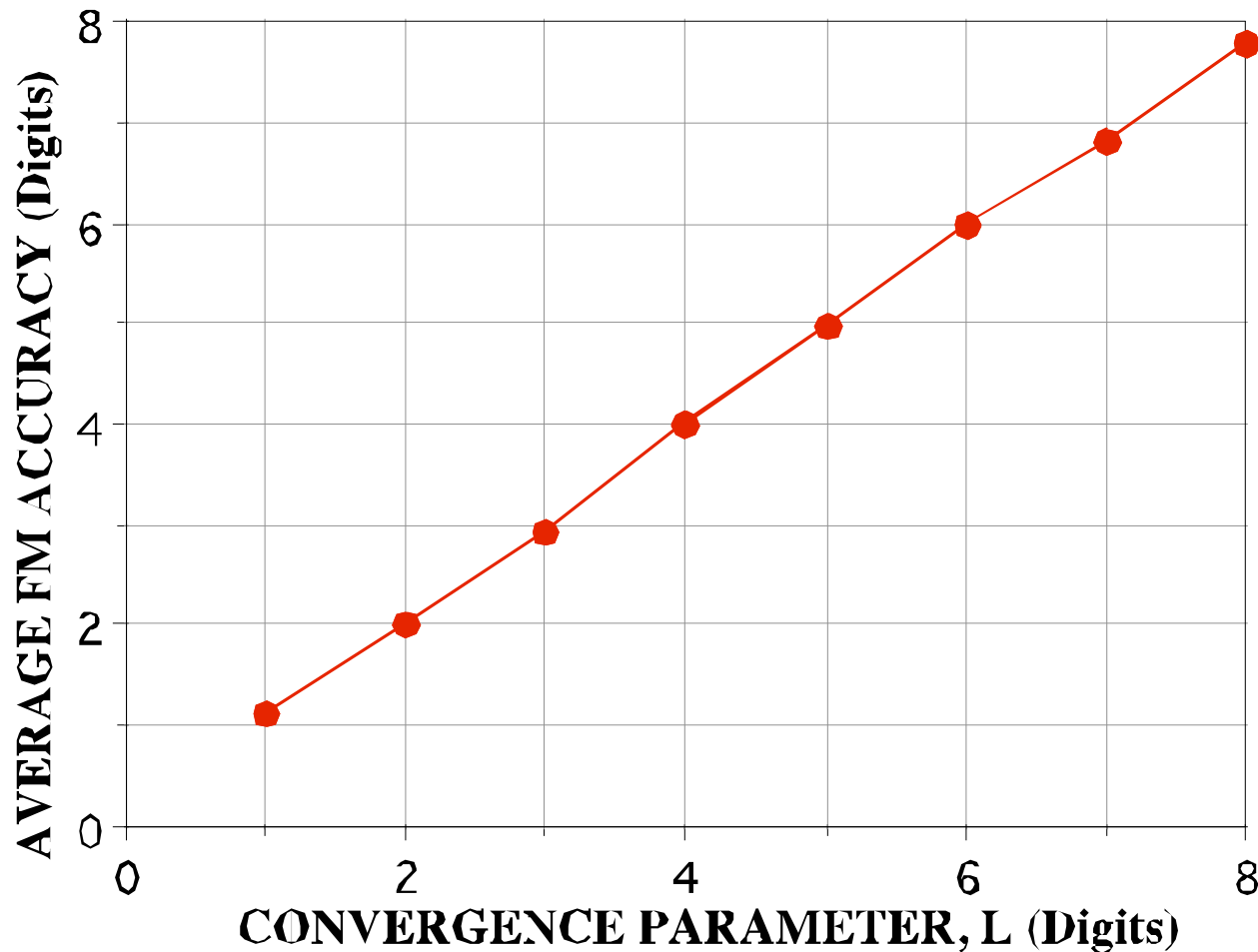
CCD-Cyl,DZ,NZ,DFvarL

C-Cyl,DZ,NZ,DFvarL

$L = 8$

LINES ARE BEST FIT TO THE DATA

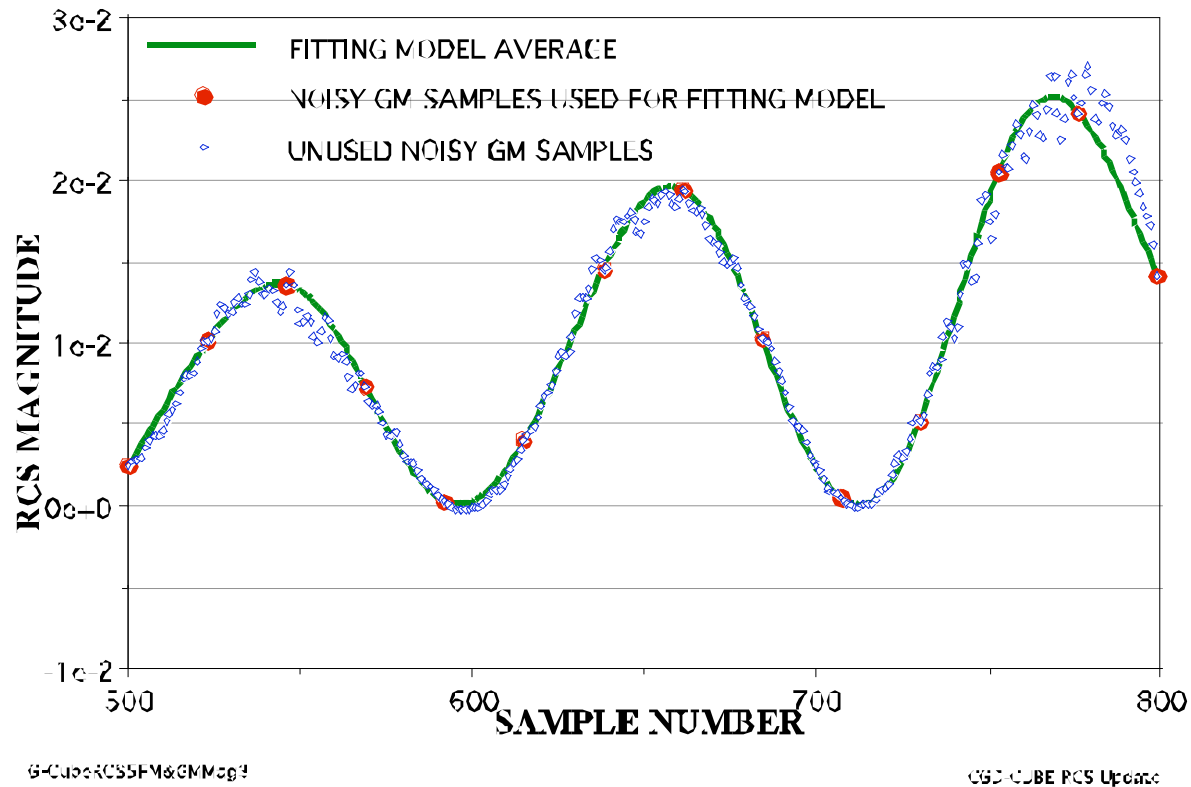
AVERAGE FITTING-MODEL ACCURACY CLOSELY TRACKS THE SERIES CONVERGENCE PARAMETER



G-ACCVsLCylinder

CGD-Cyl,D7,N7,DFvsL

MBPE CAN ALSO YIELD ERROR ESTIMATES FOR MEASURED DATA



MBPE used to estimate the accuracy of measured RCS-magnitude data. The solid line is the average of five fitting models as obtained by data samples indicated by the large, solid circles. The “o’s” are the unused data whose deviation about the average fitting model is multiplied by 3 to show the difference more clearly. The RMS difference is $\sim 3 \times 10^{-4}$. Fitting the complex version of the data is much less accurate.