

# Outerscale

## Basic Summary

The TraceMoment program calculates regressions from the log-log plots of the trace moments for various moments  $q$ . These regressions do not satisfy the cascade constraint that all the regressions must pass through the same outer scale (where the cascade effectively begins). This function takes inputs of parameters derived from the TraceMoment analysis and outputs a graph of  $\text{Log}(M)$  vs.  $\text{Log}(\lambda)$  by forcing fits through a fixed outer scale as well as a graph of  $K(q)$ . Not only does it give more reliable estimates of  $K(q)$  and hence  $C1$  and  $\alpha$ , but it also estimates the effective outer scale of the cascade (see Ch.4 of “The Weather and Climate” by Lovejoy and Schertzer).

## Inputs

The inputs of this function are “lower” and “upper” which designate the range over which the fit is calculated, “coord” and “moms” are parameters from the TraceMoment analysis, and “qmaxmax” which determines the cut-off for the moments. A typical value of qmaxmax is 21 (i.e all the moments of orders 0, 0.1, 0.2, ..., 1.9, 2.0 are used).

## Outputs

The outputs are values of the minimum error in outer scale, the error,  $C1$ , and  $\alpha$  as well as a graph of  $\text{Log}(M)$  vs.  $\text{Log}(\lambda)$  and a graph of  $K(q)$ .

Note: This function requires reslinpairsfilter, reslinpairsfiltererr, and FitFx

## Example

Input: lower=0.5  
upper=2  
inter=2  
coord=1x52 coord matrix from TraceMoment applied to globaltemp1  
moms=21x52 matrix from TraceMoment applied to globaltemp1  
qmaxmax=21

Output: 'Minimum Error Outerscale' [ 0.5000]  
'Error' [9.5327e-04]  
'C1' [ 0.0066]  
'alpha' [ 1.9891]

