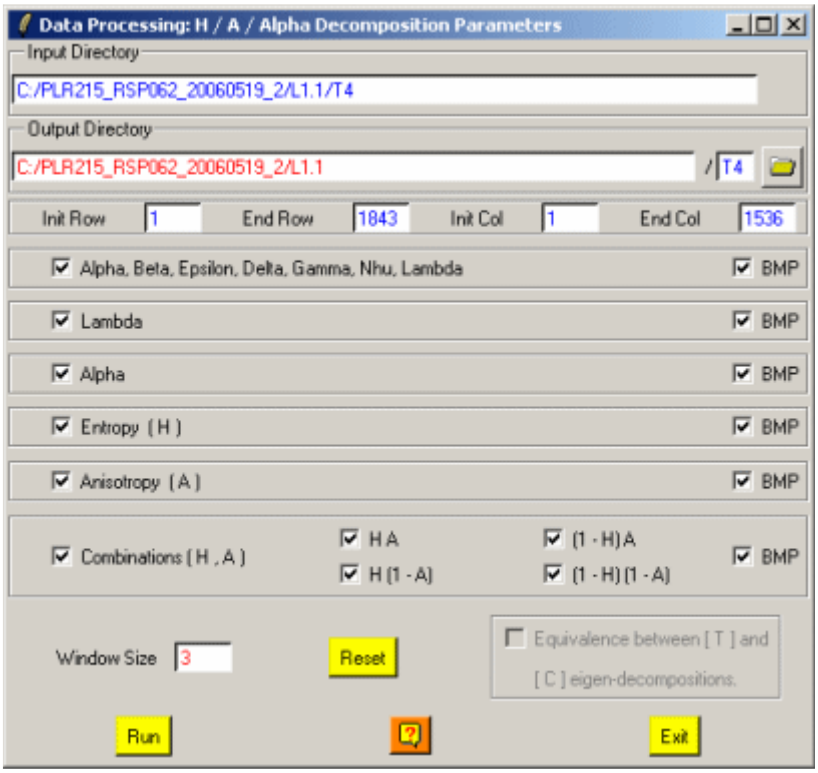
Coherency [T4] matrix - H/A/Alpha Decomposition



This program creates binary files corresponding to the different polarimetric descriptors obtained from the H/A/Alpha decomposition of the (4x4) complex Coherency matrix **[T4]** raw binary data.

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An option may be set to simultaneously create the corresponding bitmap image files.

Description:

The H/A/Alpha polarimetric decomposition is based on an eigenvector decomposition of the (4*4) complex Coherency **[T4]** matrix.

The (4x4) complex Coherency **[T4]** matrix being hermitian, semi-definite positive, its eigenvectors are orthogonal and its eigenvalues are real positive.
The eigenvector decomposition of a distributed target coherency matrix is considered as a simple statistical model consisting in the expansion of the (4x4) complex Coherency matrix into a weighted sum of four coherency matrices.

Pseudo-probabilities of the (4x4) complex Coherency **[T4]** matrix expansion elements are defined, from the set of sorted eigenvalues.

The distribution of the probabilities can be fully described by two parameters :

- The entropy (**H**) indicates the degree of statistical disorder of the scattering

phenomenon. It derives, in the Von Neumann sense, from the set of probabilities as:

- For high entropy values, i.e. superior to 0.7, a complementary parameter is necessary to fully characterize the set of probabilities. Two anisotropies, **A1** and **A2**, are defined as the relative importance of secondary scattering mechanisms.

Each unitary eigenvector of the (4x4) complex Coherency **[T4]** matrix may be parameterized using **6** real angular variables.

The condition of mutual orthogonality between the eigenvectors involve that the **4** polarimetric parameters sets resulting from the expansion are not independent. For this reason, each polarimetric parameter is associated to a **4** symbol Bernoulli statistical process.
In this way, the estimate of the mean polarimetric parameter set is given by:

A physical interpretation has been given to these **6** polarimetric descriptors (S.R Cloude, E. Pottier).

Comments:

Parameters written in Red can be modified directly by the user from the keyboard.

Input/Output Arguments:

Input Directory	Indicates the complete location of the considered **Main Directory / T4 (MD / T4)** containing the **[T4]** matrix data to be processed.
Output Directory	Indicates the location of the processed data output directory. The default value is set automatically to : **Main Directory / T4 (MD / T4)**.

Output Image Number of Rows/Columns:

The output image numbers of rows and columns are initialised to the input data set dimensions.
Users wishing to process a sub-part of the initial image can modify the **Init** and **End** values of the converted images rows and columns.
Note: init and end values have to remain within the range defined by the input image dimensions.

Processing parameters:

Window Size	Data to be decomposed may be processed through an additional filtering procedure consisting of a boxcar filter. Users have then to set the size of the (N*N) sliding window used to compute the local estimate of the average matrix. The default value of N is set to **0**. Users wishing to avoid additional filtering may set N to **1**.