

**Course 18.327 and 1.130**  
**Wavelets and Filter Banks**

**Matlab wavelet toolbox.**

# Matlab Example 3

## 1. 1-D signal analysis



MATLAB M-file

# Daubechies 9/7 pair: zeros of $H_0$ and $F_0$

```
>> example3
```

```
Zeros of H0(z)
```

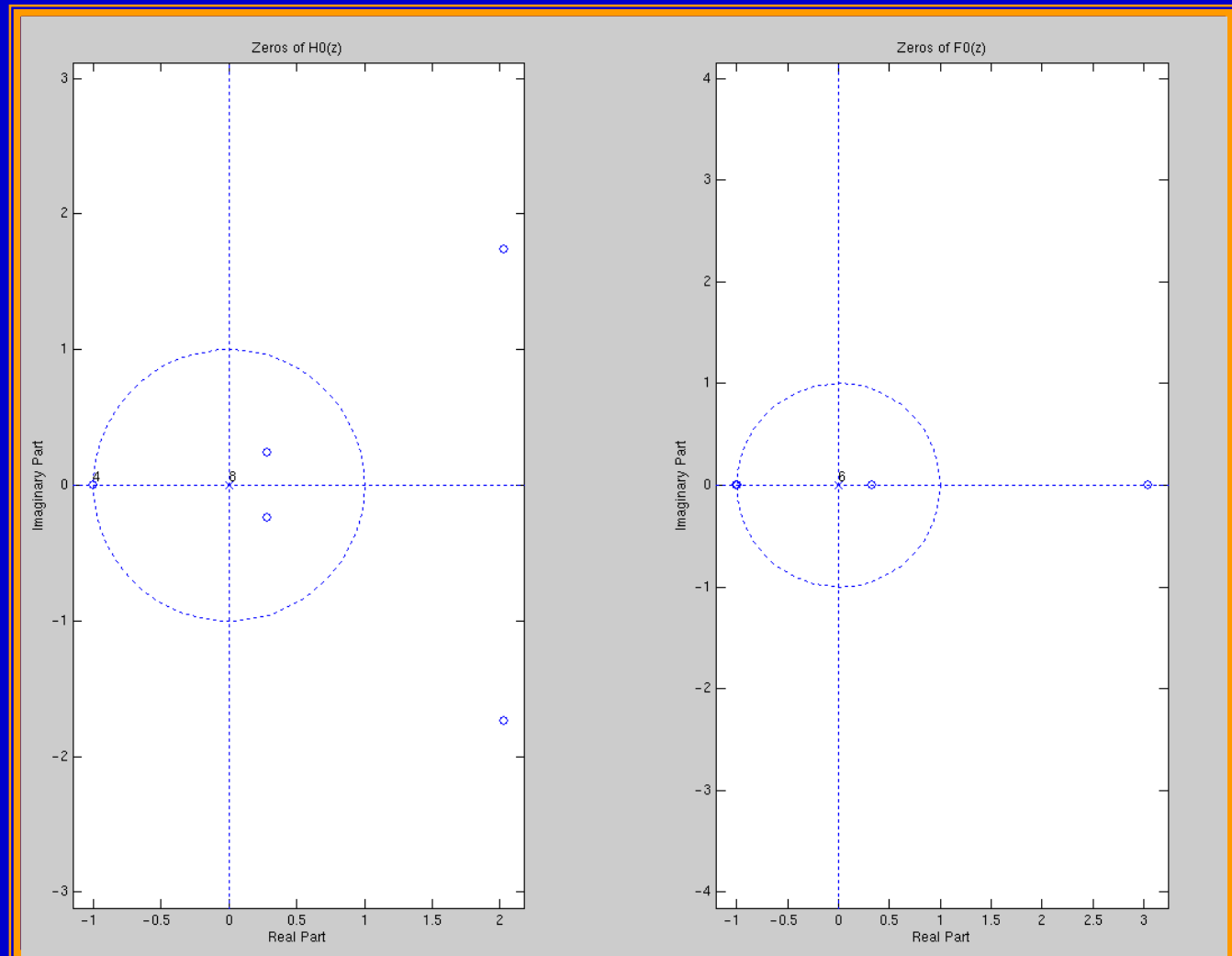
```
ans =
```

```
2.0311 + 1.7390i  
2.0311 - 1.7390i  
-1.0001 + 0.0001i  
-1.0001 - 0.0001i  
-0.9999 + 0.0001i  
-0.9999 - 0.0001i  
0.2841 + 0.2432i  
0.2841 - 0.2432i
```

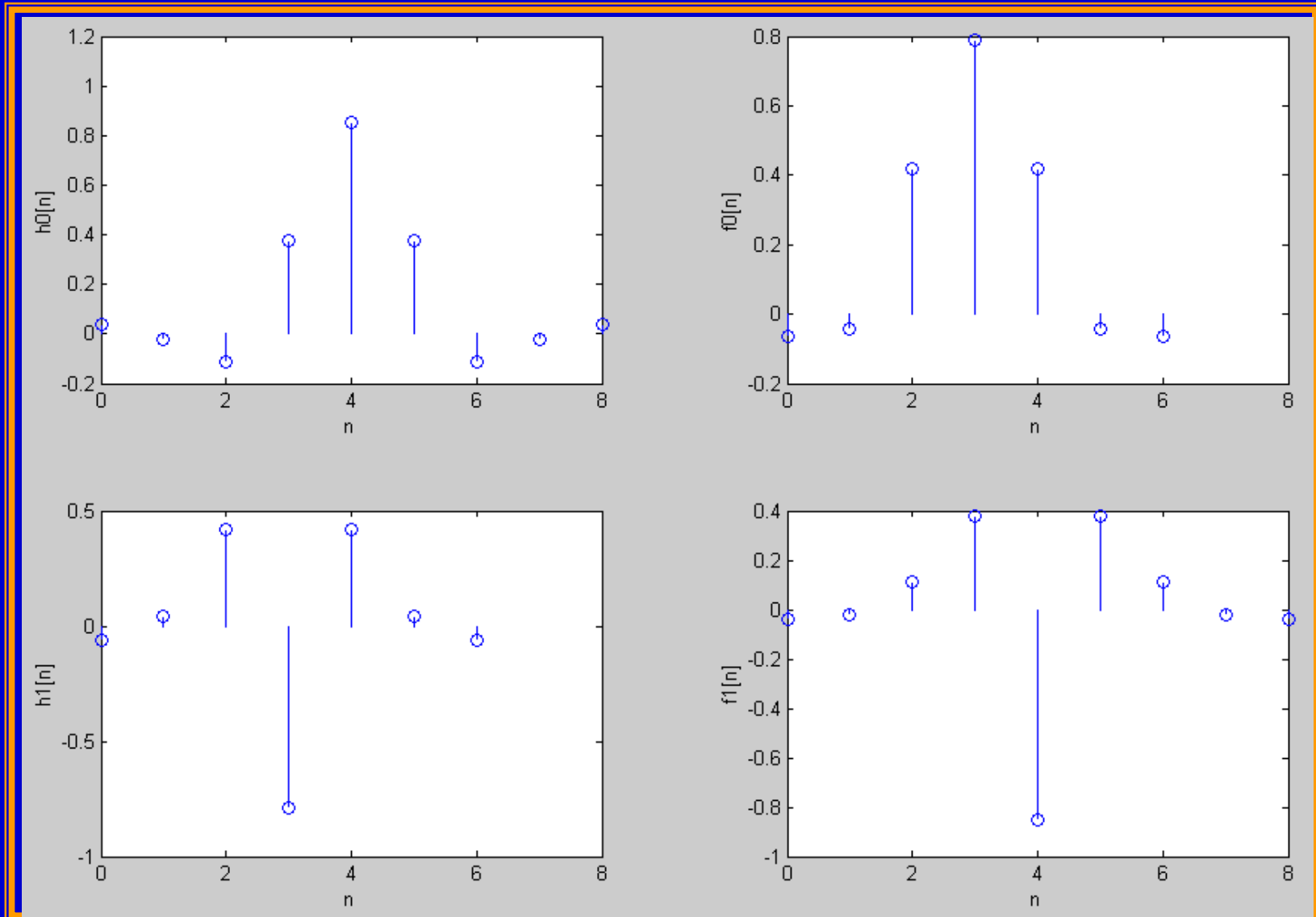
```
Zeros of F0(z)
```

```
ans =
```

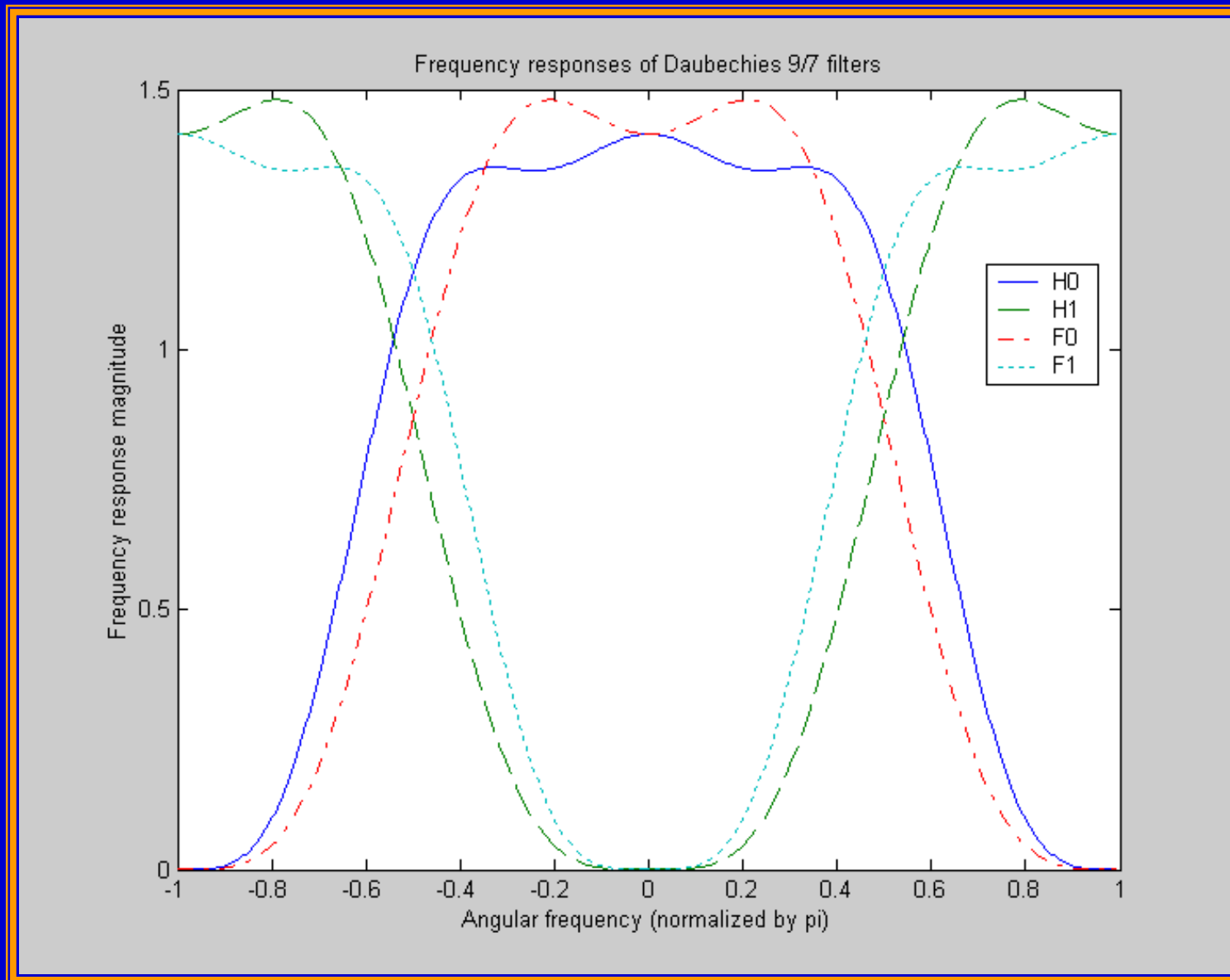
```
3.0407  
-1.0010 + 0.0010i  
-1.0010 - 0.0010i  
-0.9990 + 0.0010i  
-0.9990 - 0.0010i  
0.3289
```



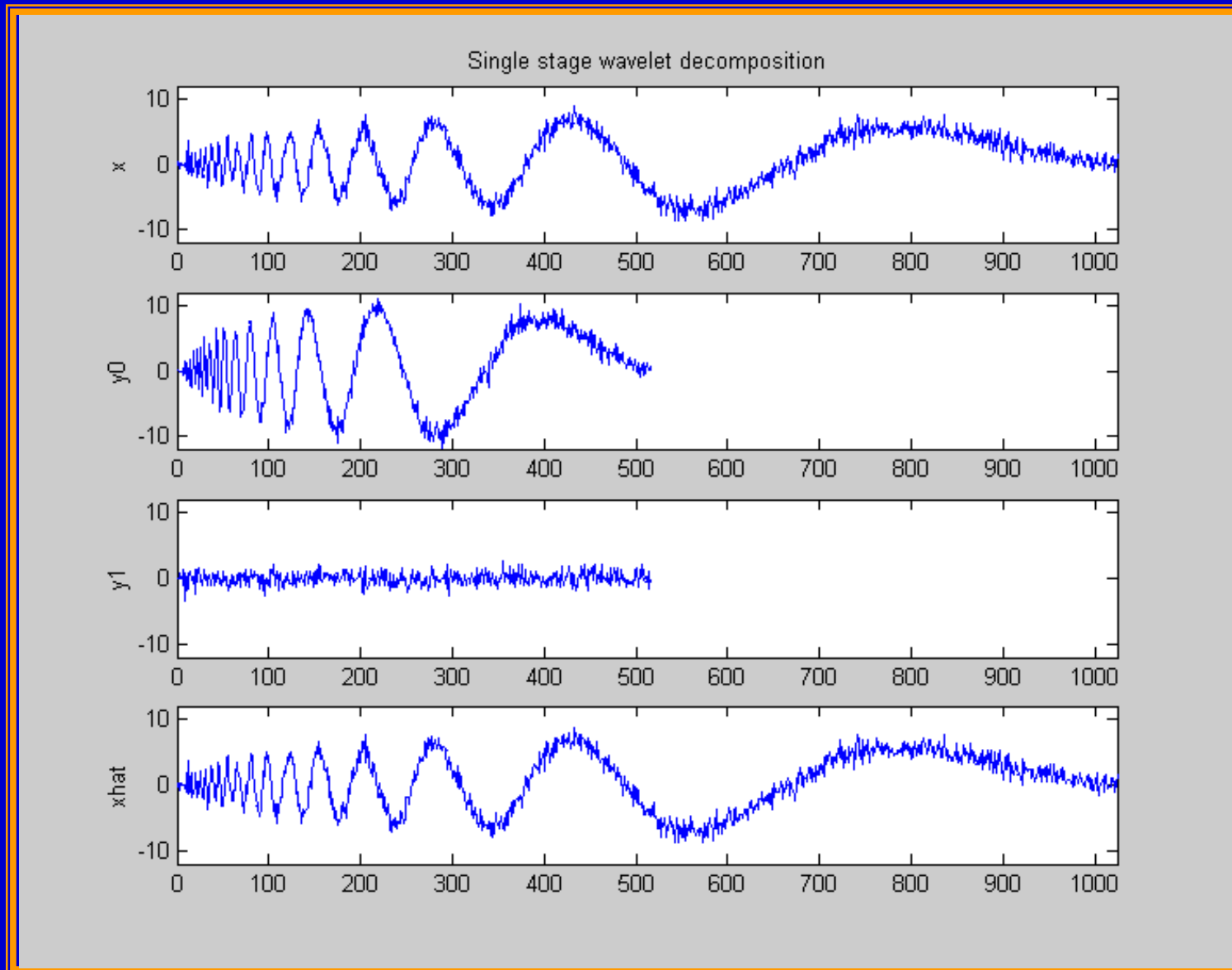
# Complete Set of Daub 9/7 Filters



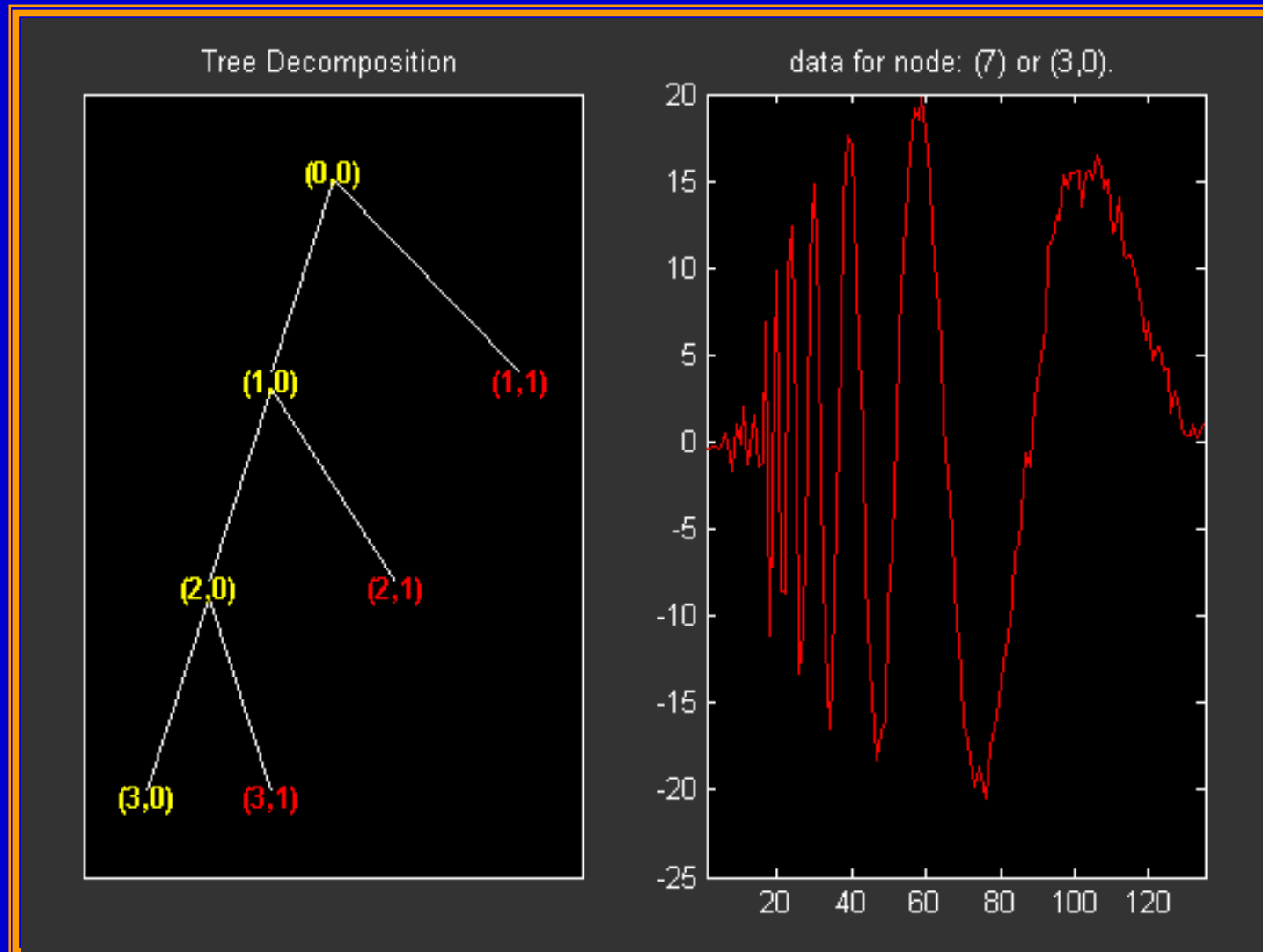
# Frequency Responses of Daub 9/7



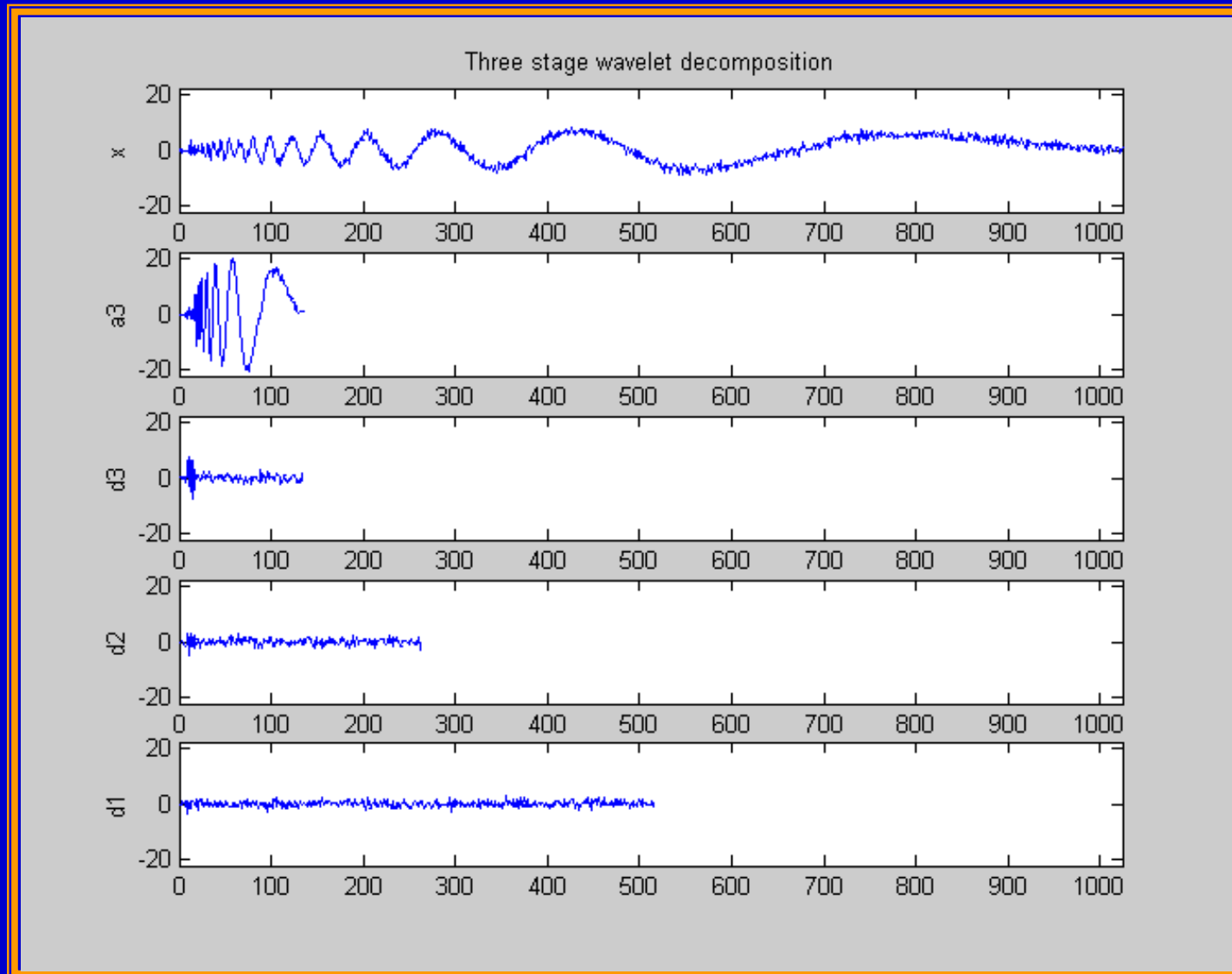
# Single Stage Decomposition



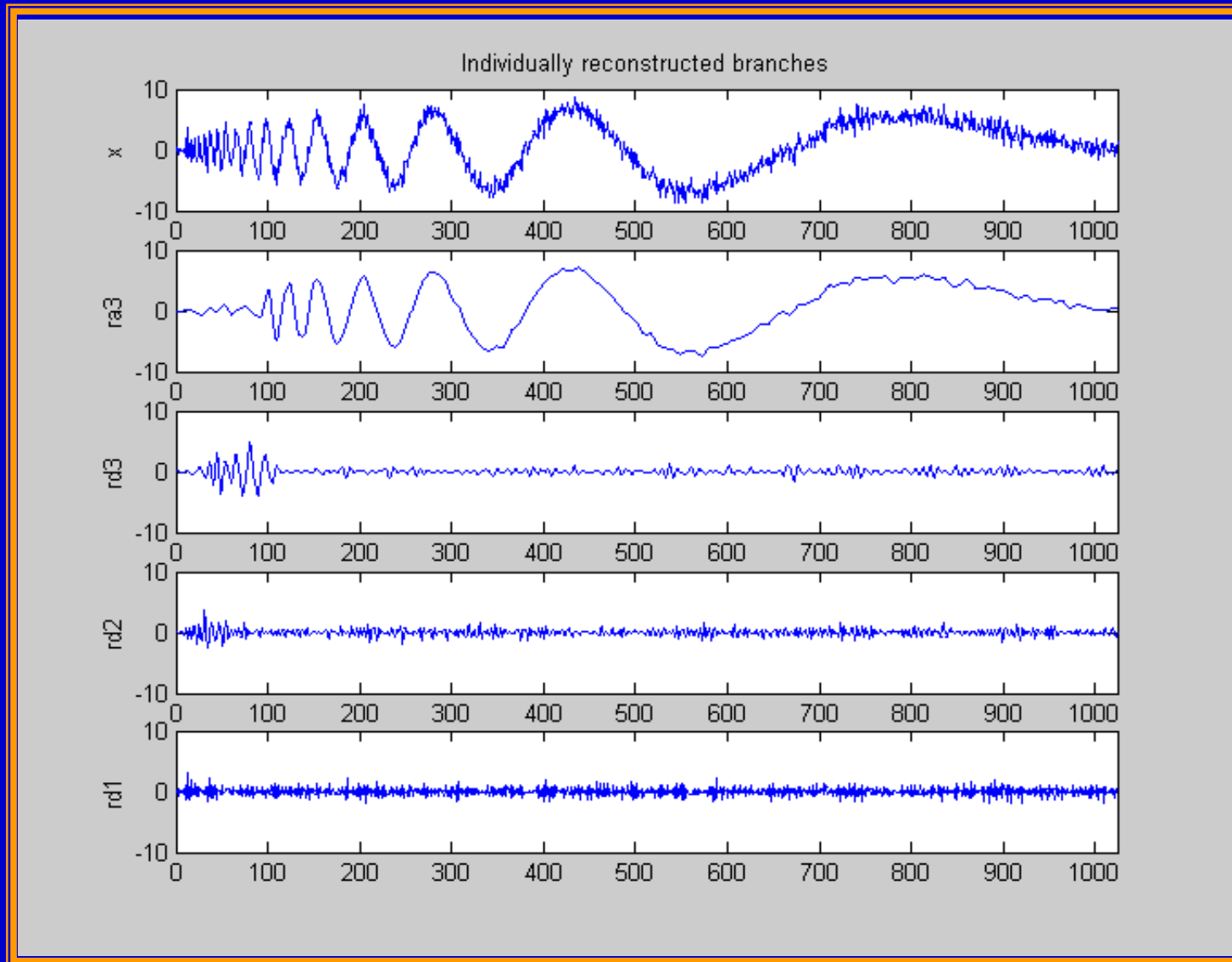
# 3-Stage Decomposition



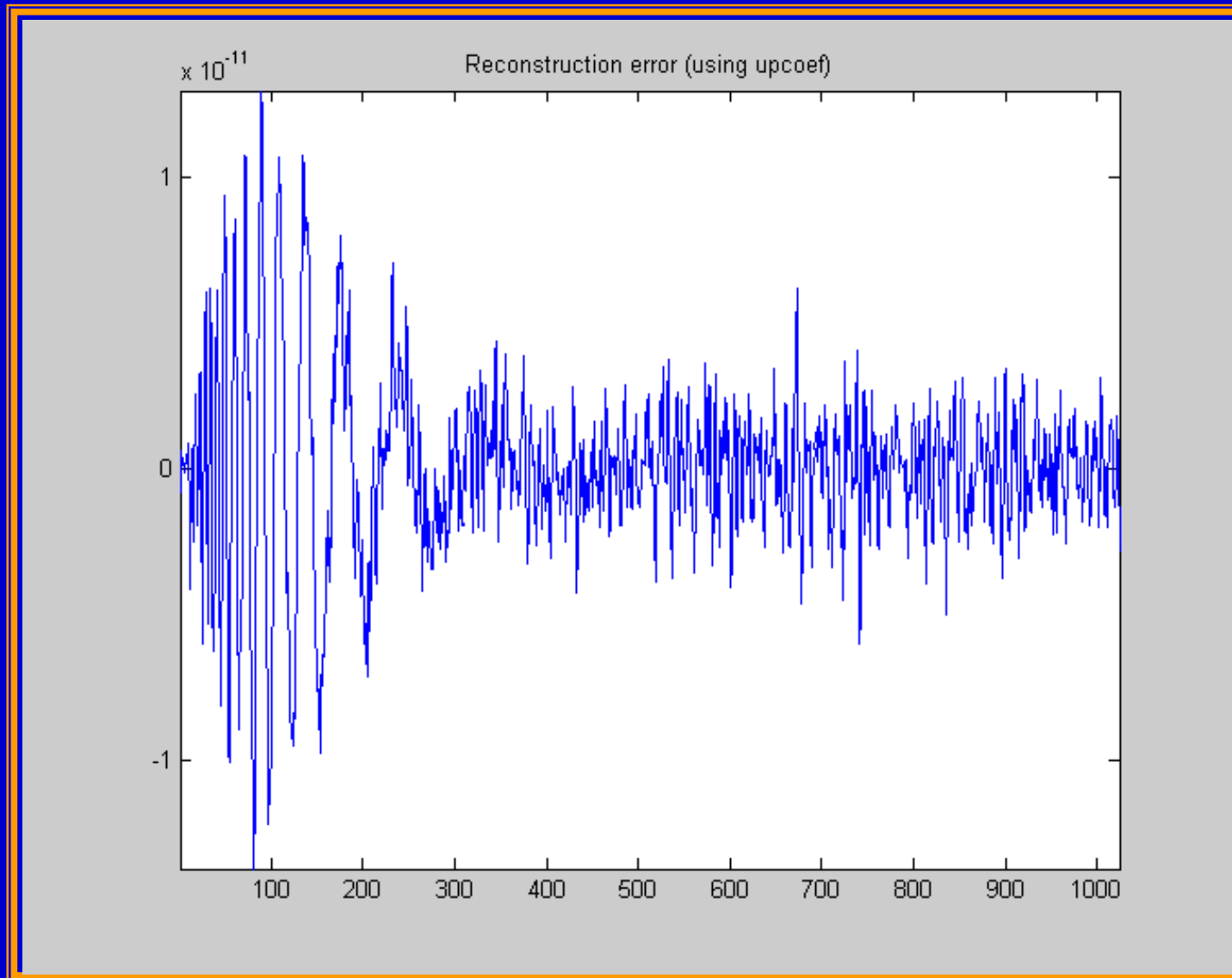
# 3-Stage Decomposition



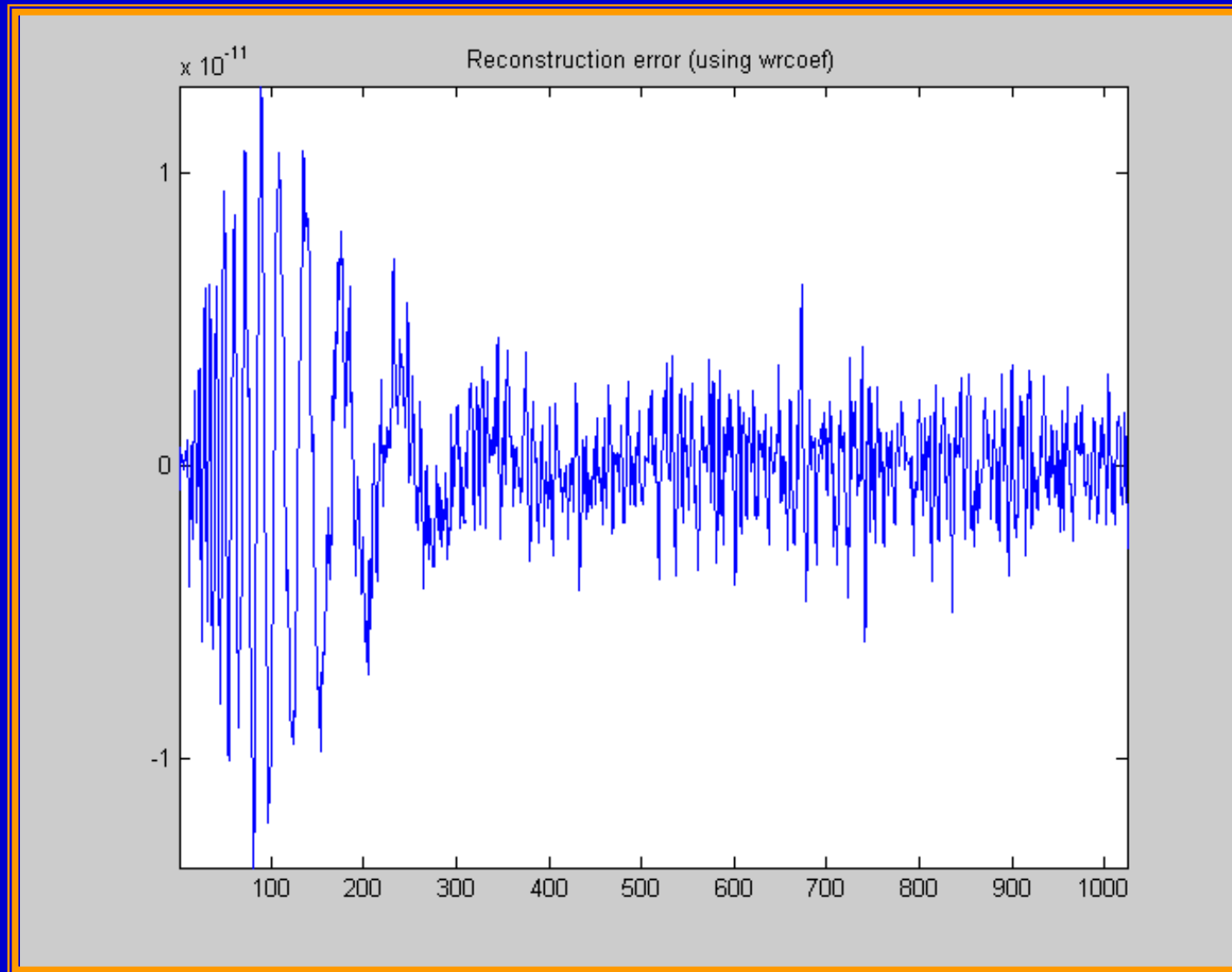
# Individually Reconstructed Branches



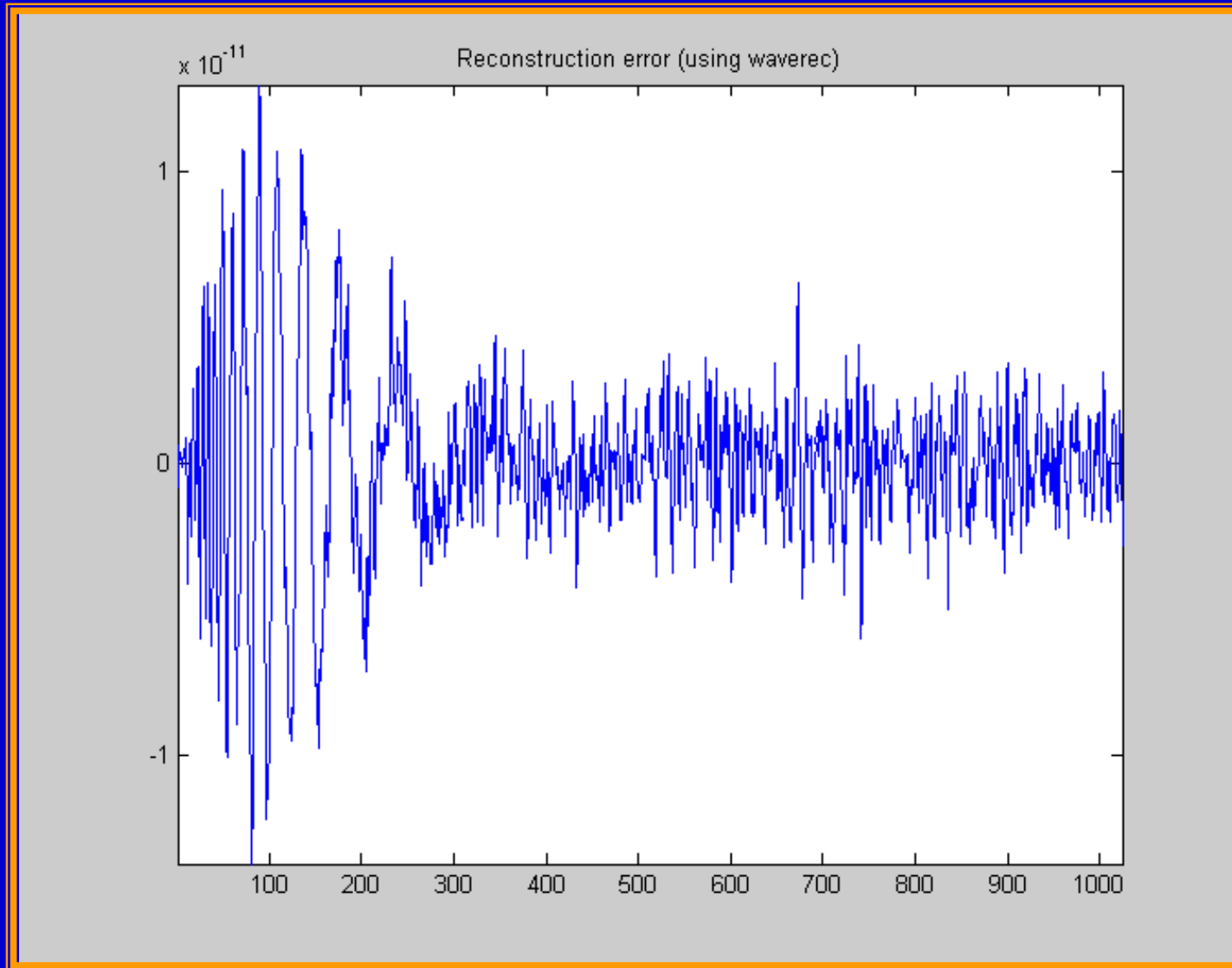
# Reconstruction Error --- upcoef



# Reconstruction Error --- wrcoef



# Reconstruction Error --- waverec



# Matlab Example 4

## 1. 2-D image analysis

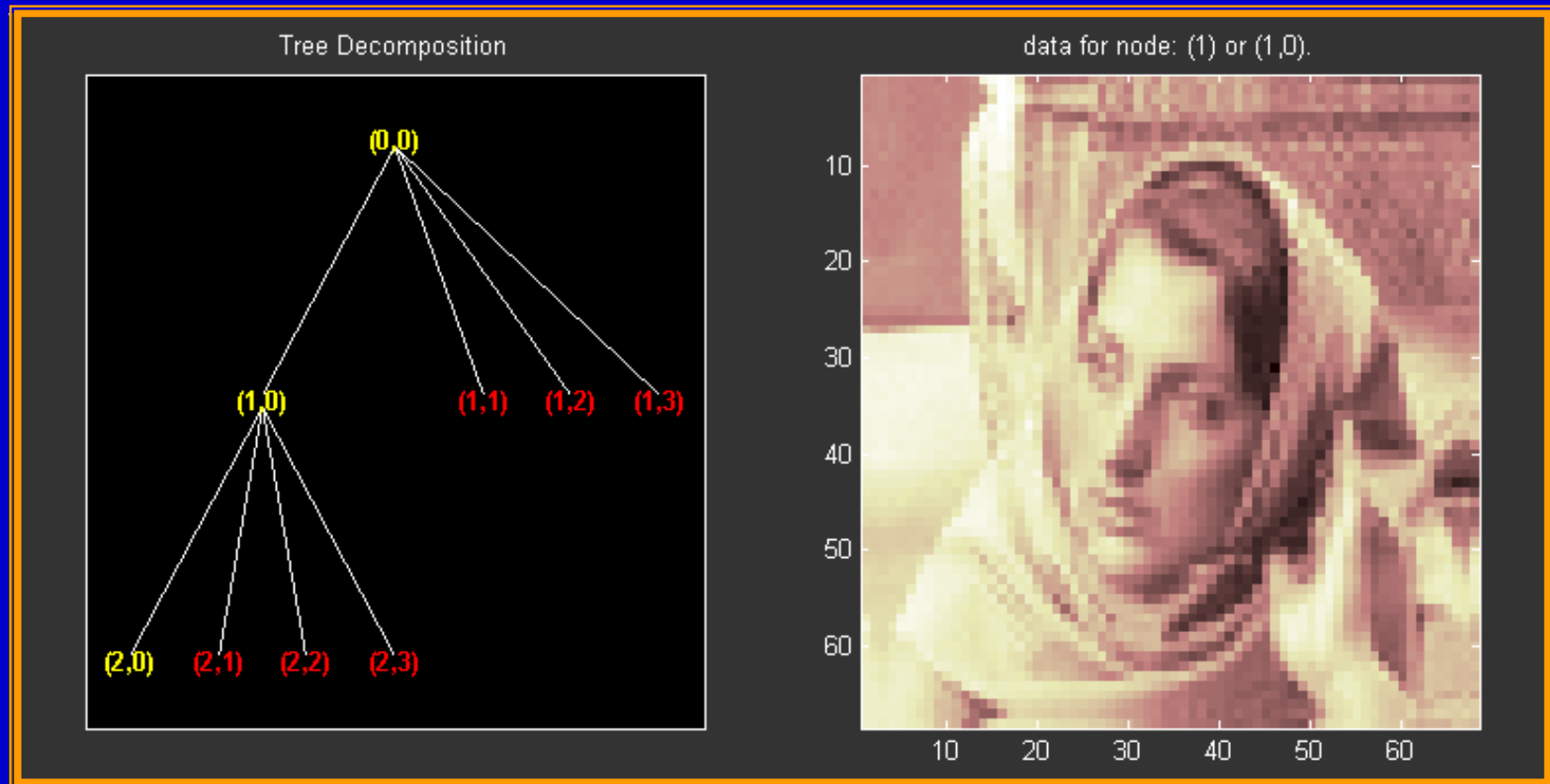


MATLAB M-file

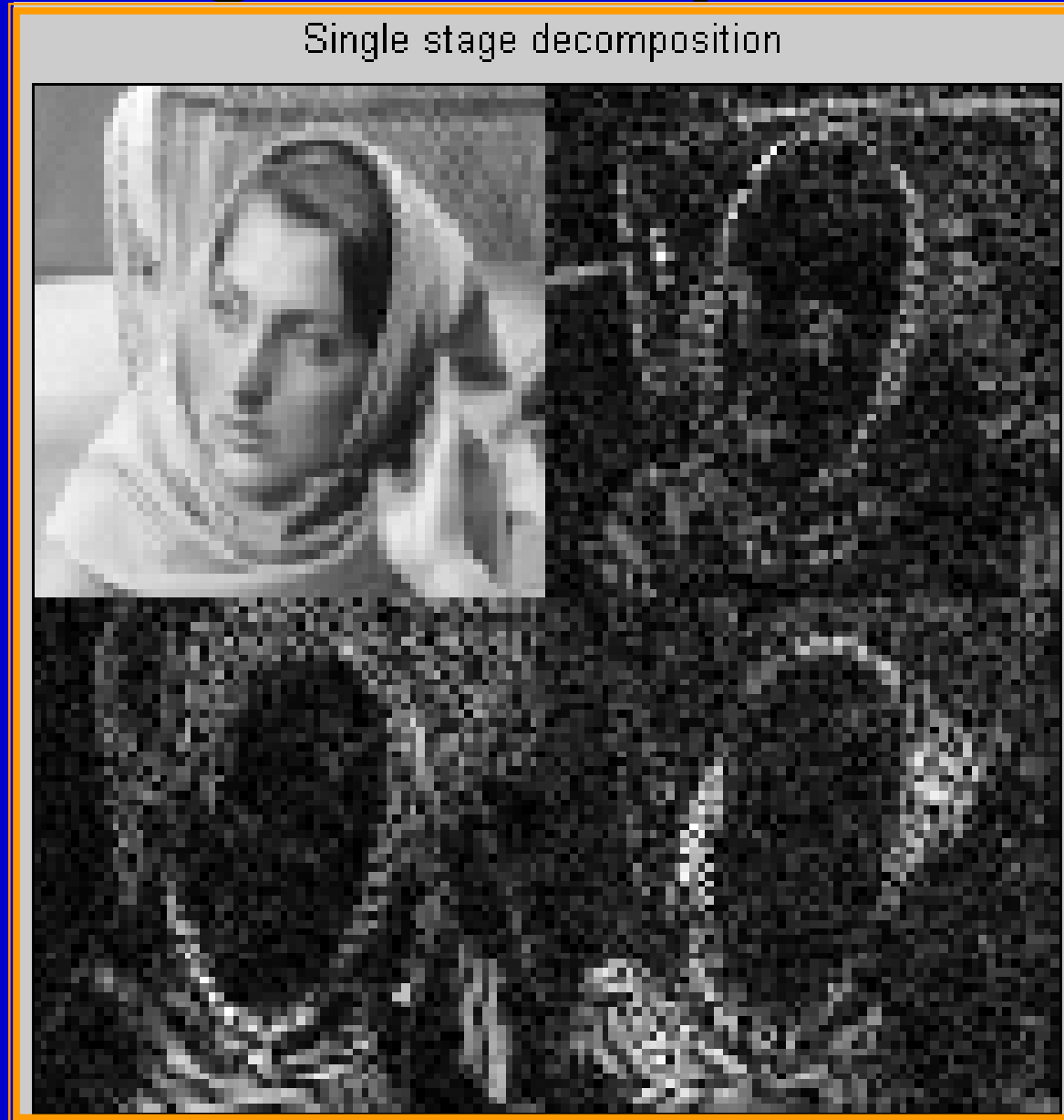
# Original Image



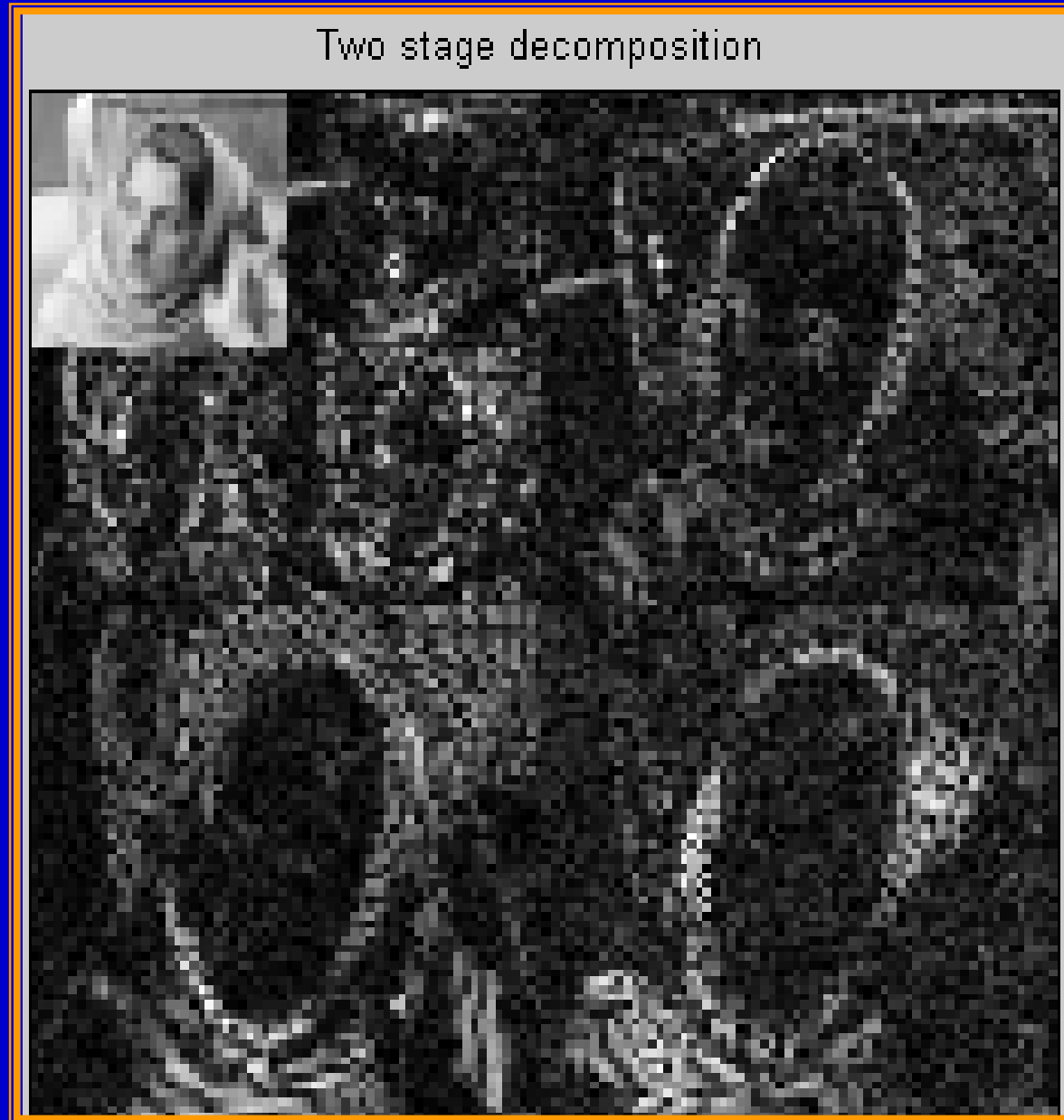
# Wavelet Decomposition



# Single Stage Decomposition



# Two-Stage Decomposition



# Reconstructed Branches

