

# ***Function description of FIR filtering***

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## FIR

### Description:

FIR creates and performs an Nth-order bandpass FIR filter in the user's data. (The user chooses the Nth order).

### Syntax:

```
[Vij_FIR,~,N1,b1] = FIR(z,currentFolder);
```

### Input variables:

Variable name	Size	Description
z	6x1	The reduced Vij data.
currentFolder	-	The FIR working folder.

### Output variables:

Variable name	Size	Description
Vij_FIR.mat	10x1	Contains the latitude and the longitude in degrees, the altitude in meters, the UTC, and the reduced filtered gravity gradients in the GRF.
Vij_FIR_Report.txt	-	Report regarding to the file format.
N1	n	N-coefficients/ the order of FIR filter.
b1	n	the Window-based FIR filter design.

## plot\_filtered\_\_sgg\_grf\_fir

### Description:

plot\_filtered\_\_sgg\_grf\_fir creates plots of the reduced filtered data in GRF in the time domain (showing how the signal changes with time).

### Syntax:

```
[ ~ ] = plot_filtered__sgg_grf_fir(Vij_FIR,z,N1,currentFolder);
```

### Input variables:

Variable name	Size	Description
Vij_FIR	6x1	Contains the reduced filtered gravity gradients in the GRF.
z	6x1	The data before the filtering
N1	n	N-coefficients/ the order of FIR filter.
currentFolder	-	The FIR working folder.

### Output variables:

Figure name	Size	Description
Filtered_FIR_Vij_GRF_date.jpeg	-	A figure in .jpeg format is saved in the FIR/ FIR Filtered Vij GRF folder.
Filtered_FIR_Vij_GRF_date.fig	-	A figure in .fig format is saved in the FIR/ FIR Filtered Vij GRF folder.

## FIR\_PSD\_plots

### Description:

FIR\_PSD\_plots creates figures with the Power Spectral Densities (PSDs) of the filtered and the unfiltered reduced GOCE signal. (unit in figures: Eötvös/sqrt(HZ)).

### Syntax:

```
[k] = FIR_PSD_plots(z, Vij_FIR,N1,currentFolder);
```

### Input variables:

Variable name	Size	Description
z	6x1	The data before the filtering
Vij_FIR	6x1	Contains the reduced filtered gravity gradients in the GRF.
N1	n	N-coefficients/ the order of FIR filter.
currentFolder	-	The FIR working folder.

### Output variables:

Figure name	Size	Description
PSD_GG_GRF_FIR_N_date.jpeg	-	A figure in .jpeg format is saved in the FIR/ PSD FIR filtered Vij GRF folder.
PSD_GG_GRF_FIR_N_date.jpeg. fig	-	A figure in .fig format is saved in the FIR/ PSD FIR filtered Vij GRF folder.

## stats\_filtered\_SGG\_GRF

### Description:

stats\_filtered\_SGG\_GRF computes the statistics (min, max, mean, std, rms) of the filtered - reduced data.

### Syntax:

```
[ ~ ] = stats_filtered_SGG_GRF( Vij_filtered,currentFolder);
```

### Input variables:

Variable name	Size	Description
Vij_filtered	6x1	Contains the reduced filtered gravity gradients in the GRF.
currentFolder	-	The FIR working folder.

### Output variables:

Variable name	Size	Description
stats_filtered_Vij_GRF.mat	nx6	Statistics of the filtered Vij in GRF.
stats_filtered_Vij_GRF_Report.txt	-	Report regarding to the file format.