MIMO Tilt decoupling

1) ISI Inertial Sensors are used to estimate the inertial rotation:

$$\begin{Bmatrix} RX \\ RY \end{Bmatrix}_{ISI} = \begin{Bmatrix} Y \\ X \end{Bmatrix}_{ISI} * \frac{\omega^2}{g}$$

2) HEPI translation and rotation drive the ISI in rotation as follow:

$$\begin{Bmatrix} RX \\ RY \end{Bmatrix}_{ISI} = [A] \begin{Bmatrix} X \\ Y \end{Bmatrix}_{HEPI} + [B] \begin{Bmatrix} RX \\ RY \end{Bmatrix}_{HEPI}$$

3) Introduction of a tilt correction matrix

$$\begin{Bmatrix} RX \\ RY \end{Bmatrix}_{HEPI} = [C] \begin{Bmatrix} X \\ Y \end{Bmatrix}_{HEPI}$$

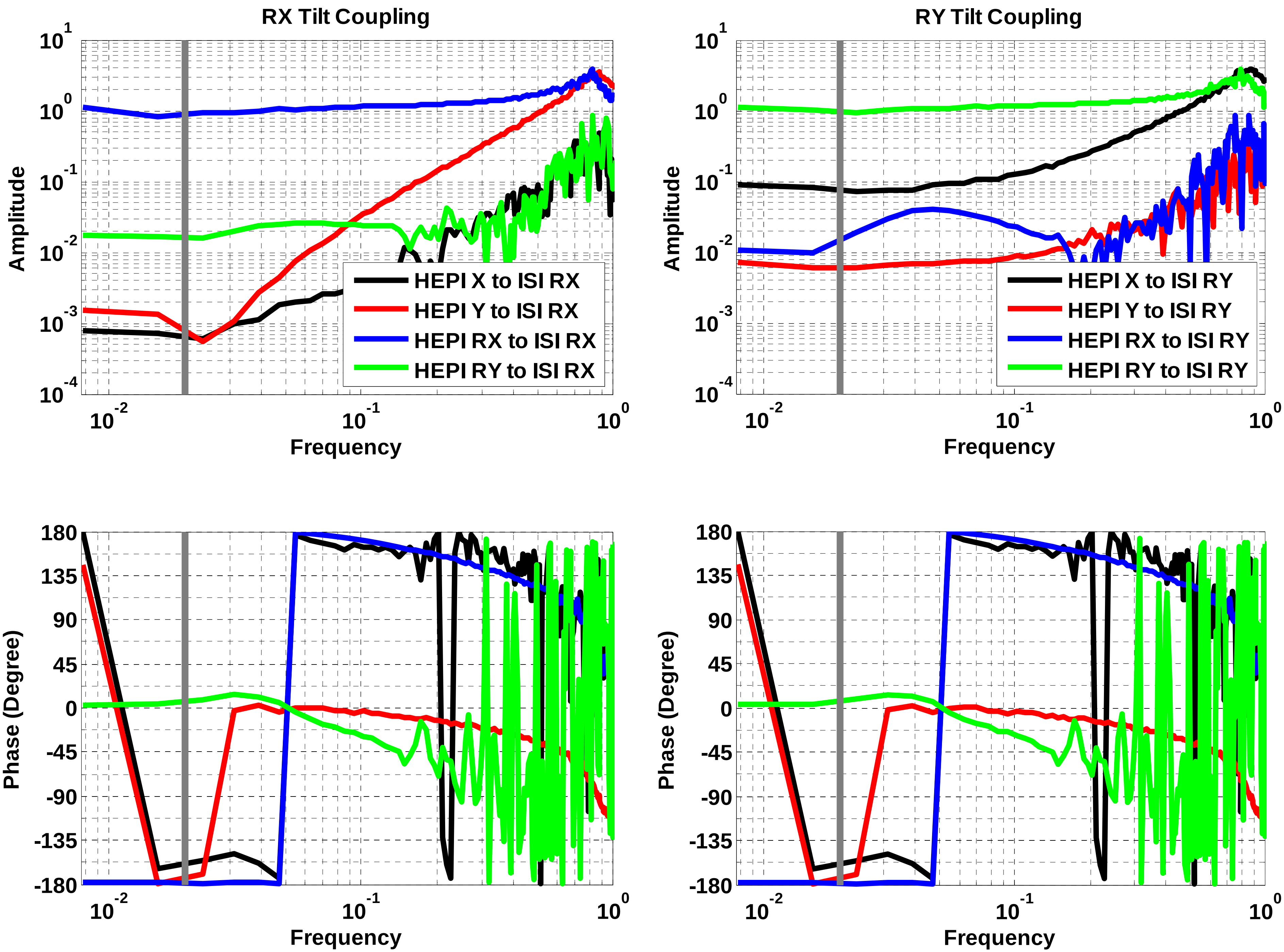
4) Calculation of C to cancel the ISI rotation:

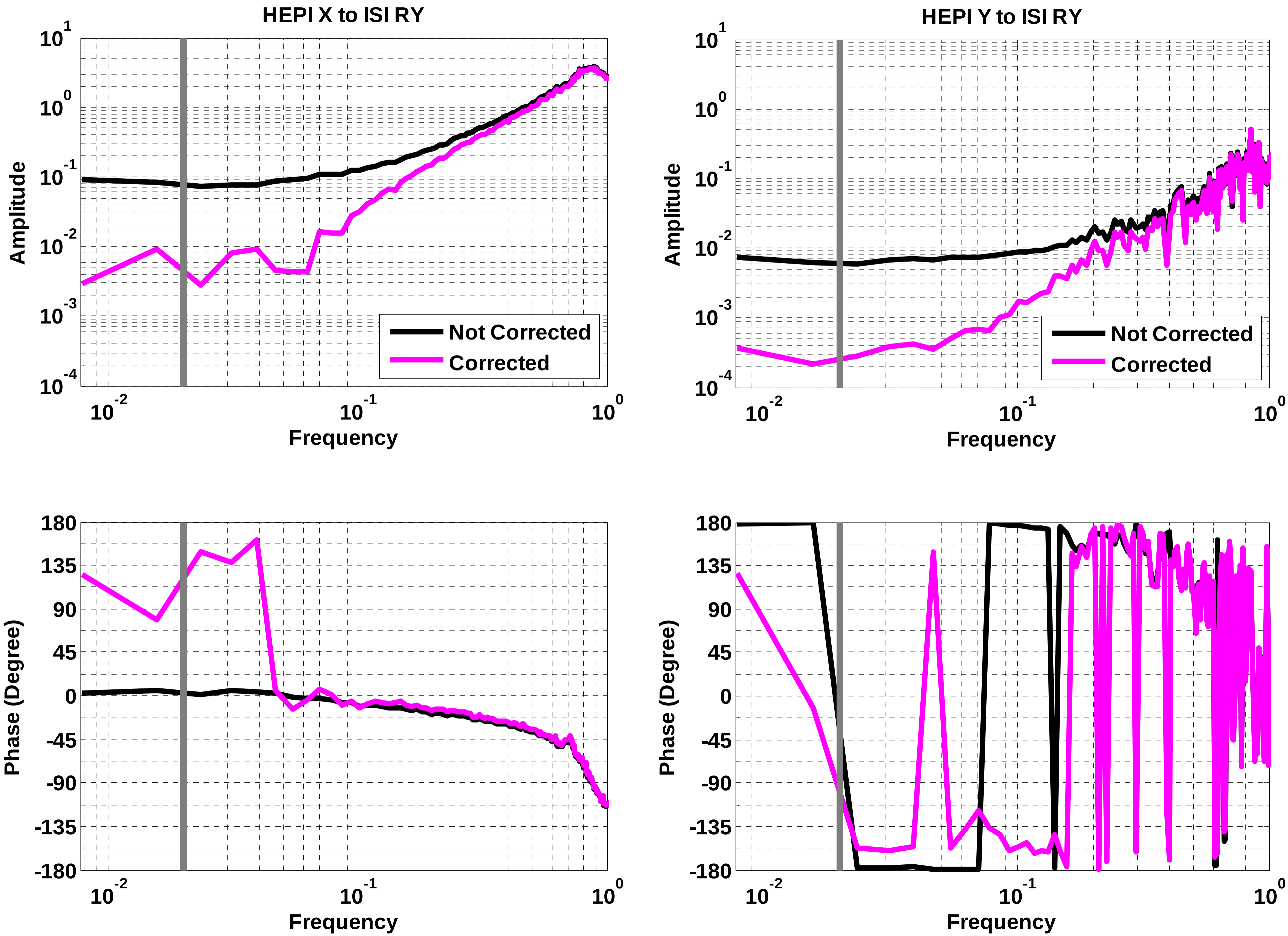
$$\begin{Bmatrix} RX \\ RY \end{Bmatrix}_{ISI} = [A] \begin{Bmatrix} X \\ Y \end{Bmatrix}_{HEPI} + [B]\,[C] \begin{Bmatrix} X \\ Y \end{Bmatrix}_{HEPI} = 0$$

Correction matrix including the cross couplings

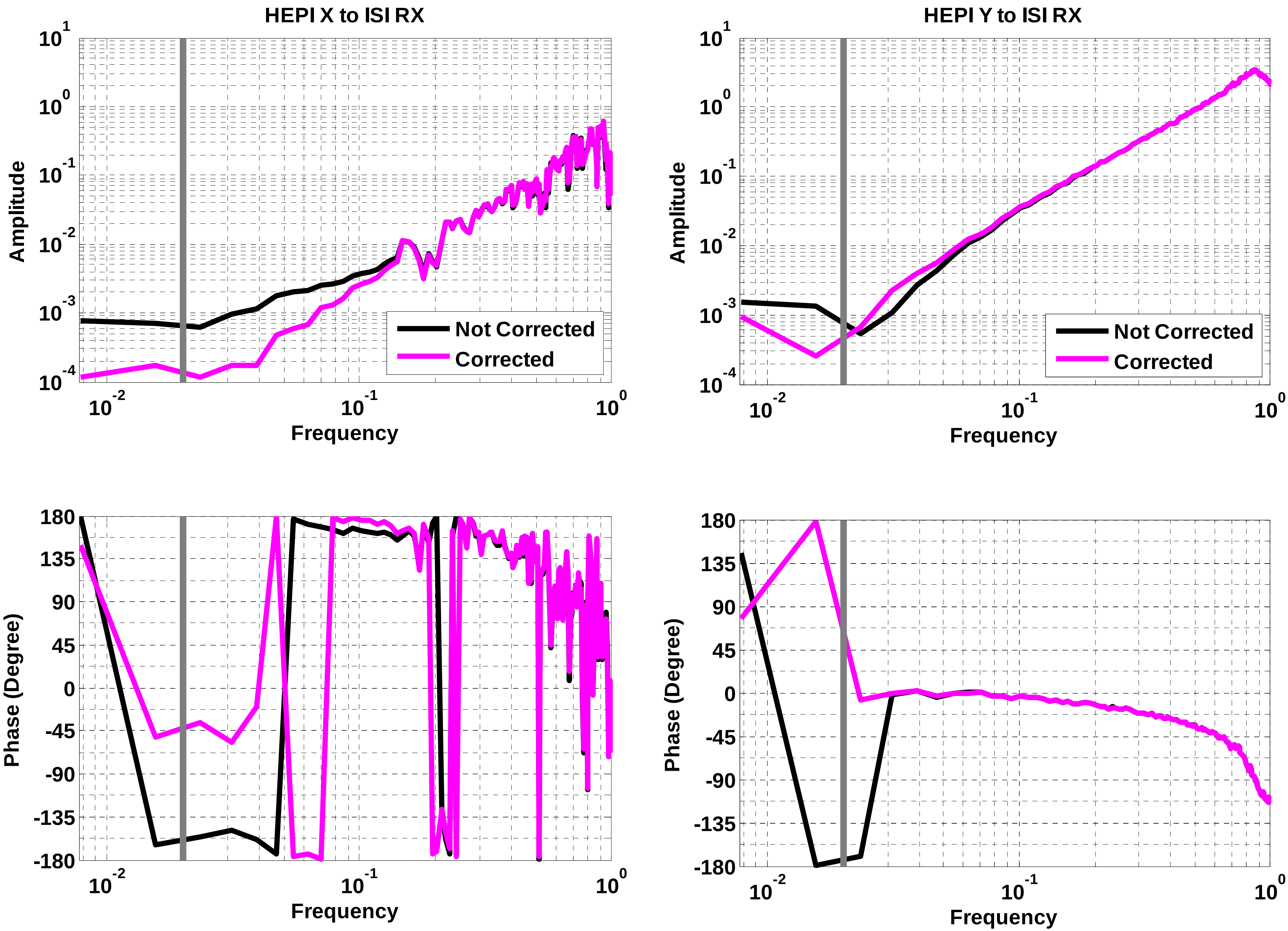
$$[C] = -[B]^{-1}[A]$$

5) Transfer functions in page 2 are used to extract the 2x4 complex coefficients filling matrix A and B. Only the data on the left side of the grey vertical line is being used.
6) The predicted results are calculated using:
   $$\begin{Bmatrix} RX \\ RY \end{Bmatrix}_{ISI} = \left[[A]_{expe} + [B]_{\ expe}\ real([C])\right] \begin{Bmatrix} X \\ Y \end{Bmatrix}_{HEPI} = 0$$
   Results are shown in page 3 and 4.


RX Tilt Coupling
RY Tilt Coupling
Amplitude
Frequency
Phase (Degree)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
180
135
90
45
0
-45
-90
-135
-180
HEPI X to ISI RX
HEPI Y to ISI RX
HEPI RX to ISI RX
HEPI RY to ISI RX
HEPI X to ISI RY
HEPI Y to ISI RY
HEPI RX to ISI RY
HEPI RY to ISI RY



HEPI X to ISI RY
HEPI Y to ISI RY
Amplitude
Phase (Degree)
Frequency
Not Corrected
Corrected


HEPI X to ISI RX
HEPI Y to ISI RX
Amplitude
Phase (Degree)
Frequency
Not Corrected
Corrected
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
180
135
90
45
0
-45
-90
-135
-180