TBT Data from Booster in AC Mode

4/22/2004

Experimental Conditions & Data Analysis

Experiments :

- AC operation mode (with acceleration)
- Corrector settings (i.e. trim quads) as in normal operation
- 1 turn or 4 turn injection (results below are from 4 turn injection cycle)
- Horizontal kicker at L08, fired every 0.5 ms

Data Analysis :

- Using Independent Component Analysis (ICA)
- BPM gains obtained in last November with ORM are applied *
- Frequency filtering for better results

Low-frequency filtering: subtract running average of neighboring 20-turn zone (marked as M20)

High-frequency filtering: keep only running average of neighboring 5-turn zone (marked as P5)

Results :

- Linear optics measurements (β, ψ, dispersion)
- Other modes of interests.

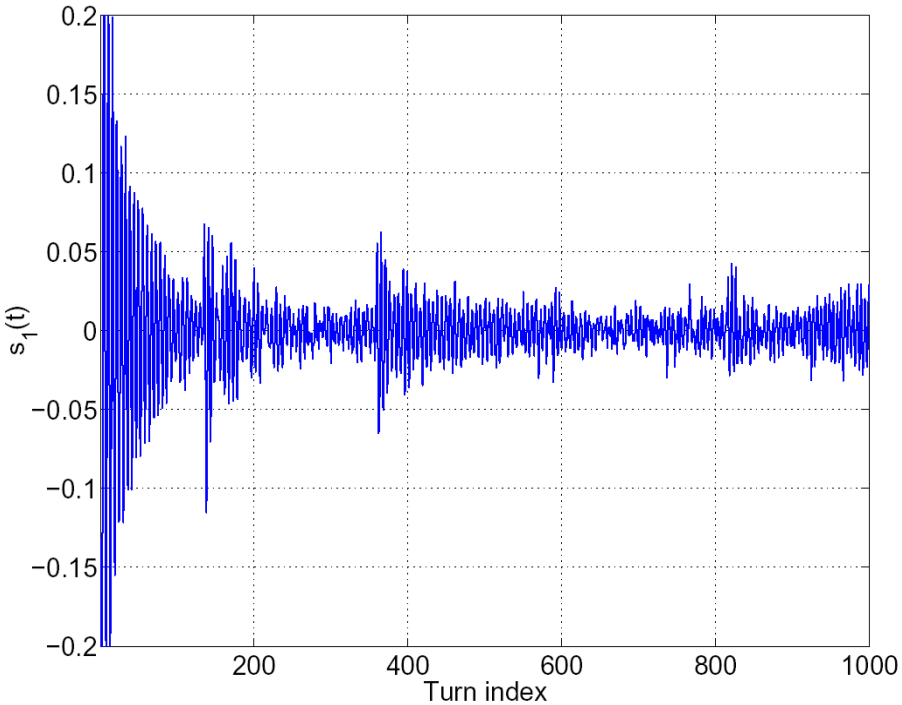
**BPM gain at HL06 was about 3.0, now it's back to normal (nearly 1.0).*

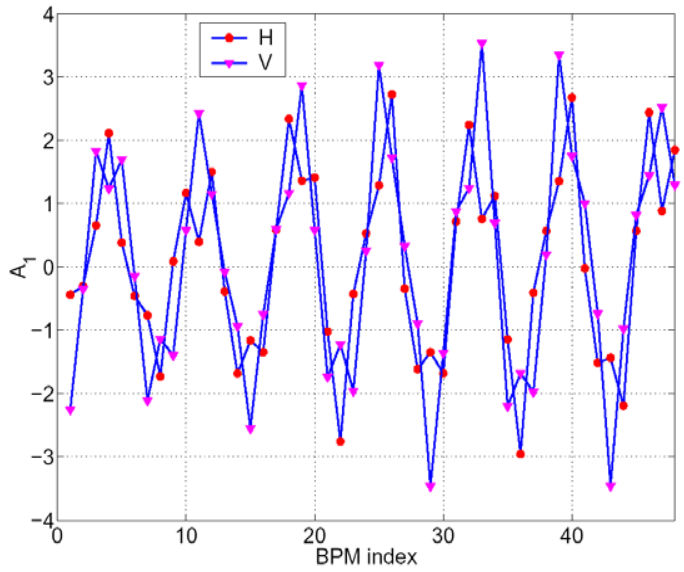
Linear Optics Measurement

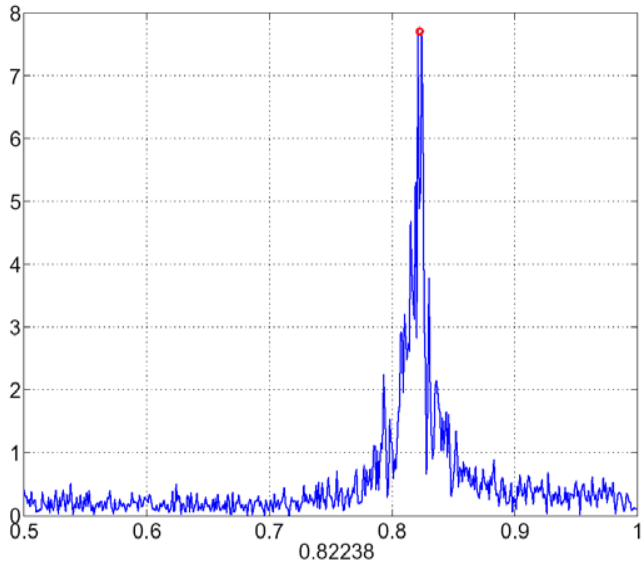
1. Measured β, ψ and D are compared to MAD model.
2. Actual trim quads setting (dc + ramp) and kinetic energy are put into model
3. Low-frequency are filtered for β, ψ measurements (M20)
4. High-frequency are filtered for dispersion measurements (P5)

Mode 1

Turn 1 – 1000, M20
[0, 1, 2, 3, 4]



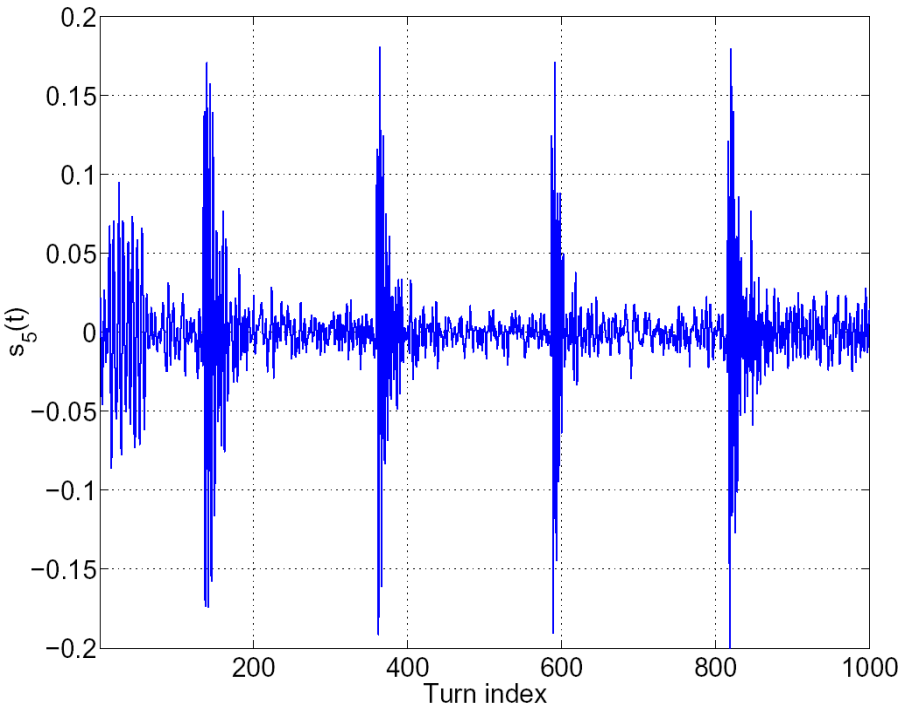


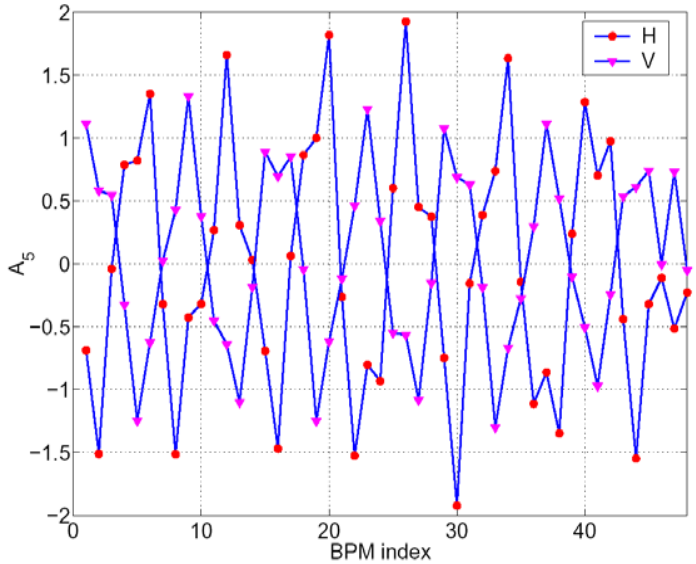


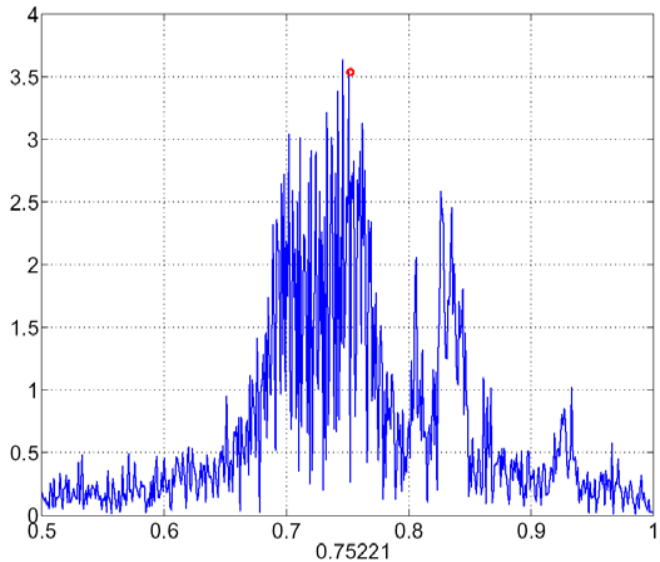
One of the two ‘plus’ betatron mode

Mode 5

Turn 1 – 1000, M20
[0, 1, 2, 3, 4]



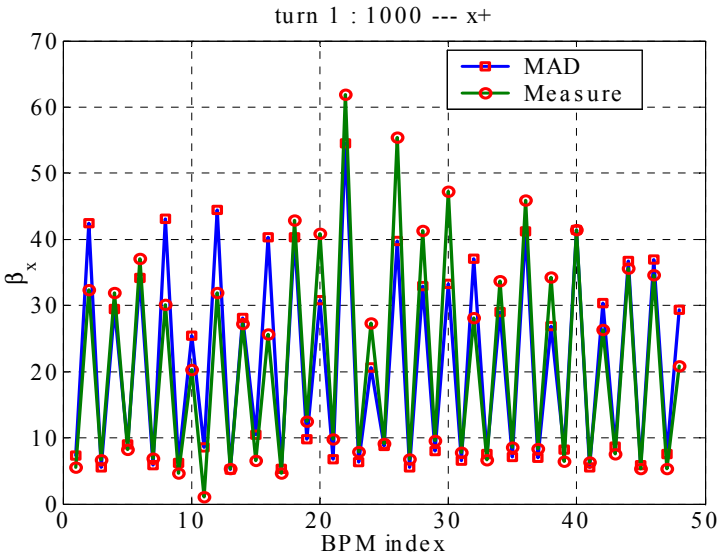


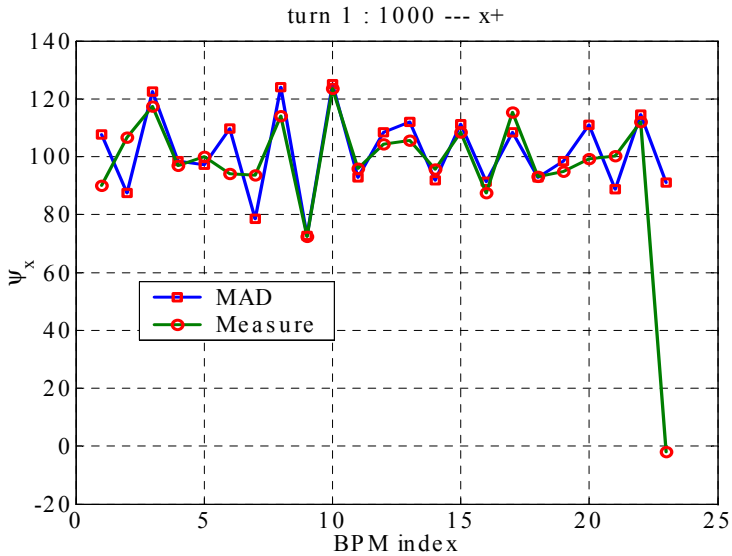


One of the two ‘minus’ betatron mode

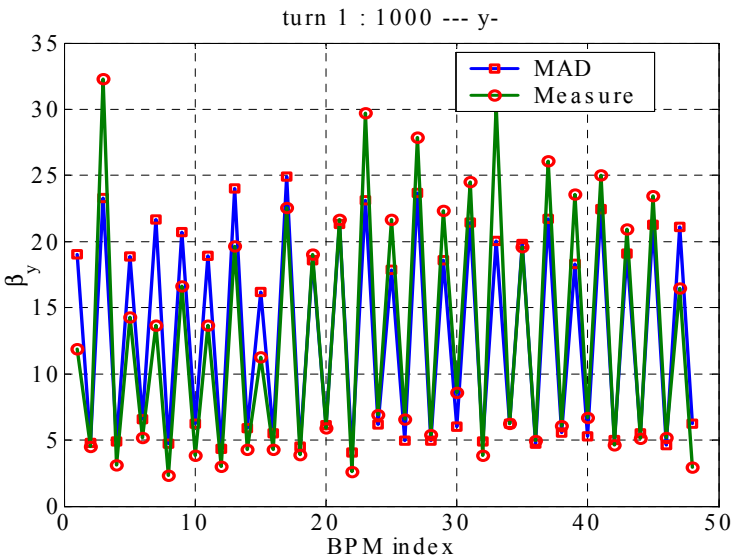
β & ψ

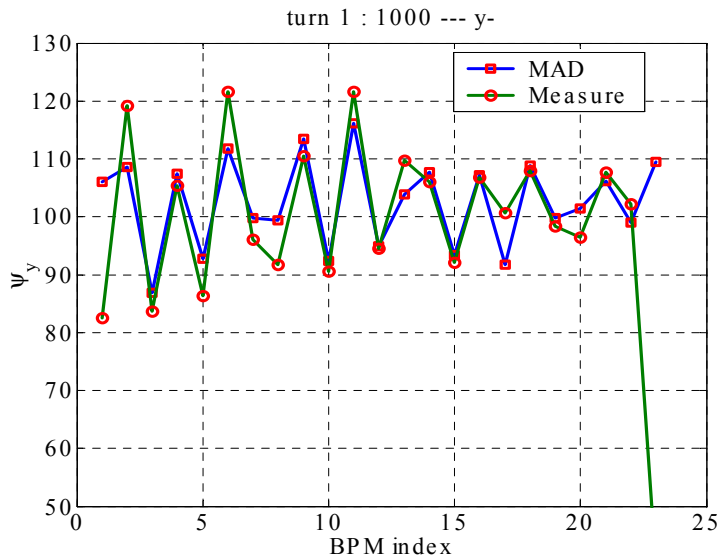
βx


turn 1 : 1000 --- x+
MAD
Measure
β_x
BPM index


turn 1 : 1000 --- x+
MAD
Measure
ψ_x
BPM index

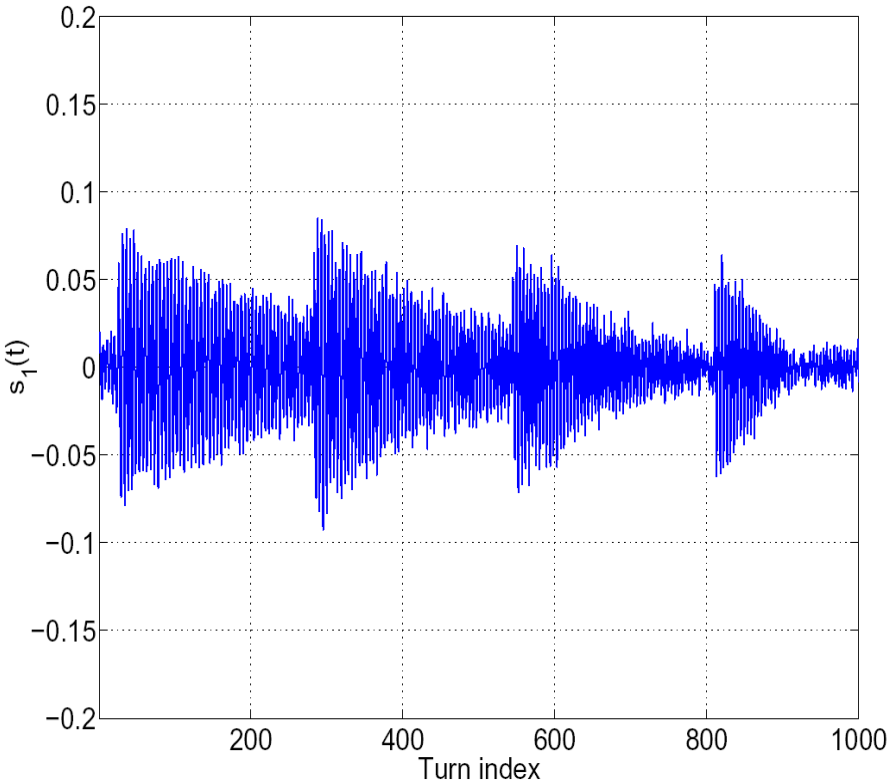
βy

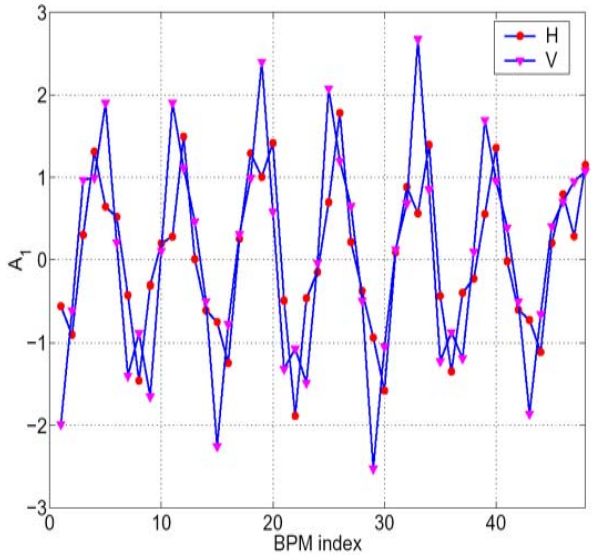

turn 1 : 1000 --- y-
MAD
Measure
β_y
BPM index

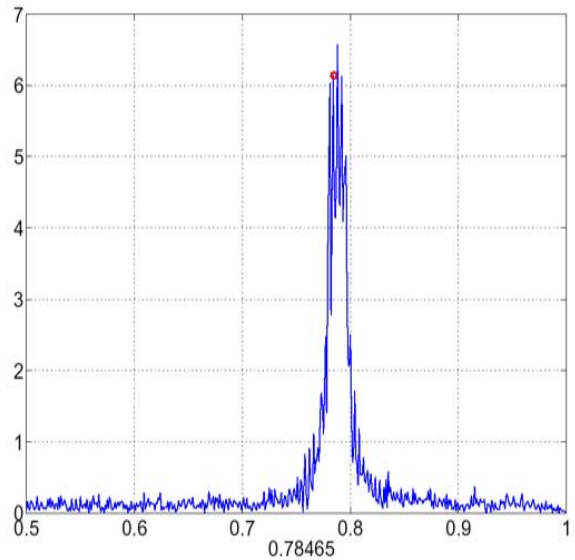

turn 1 : 1000 --- y-
MAD
Measure
ψ_y
BPM index

Mode 1

Turn 2000 – 2999, M20
[0, 1, 2, 3, 4]



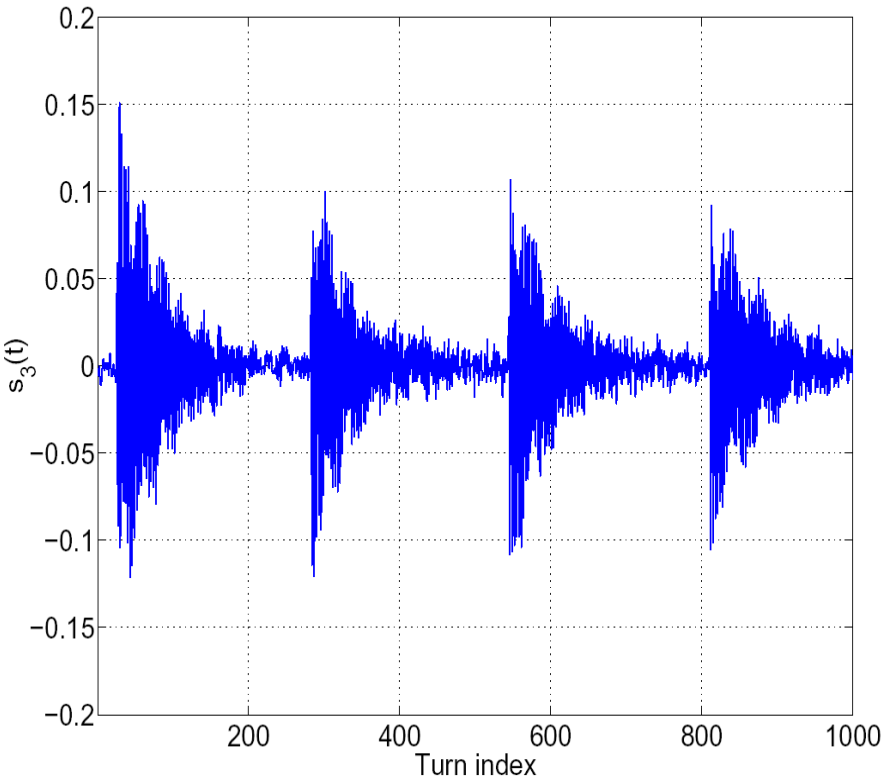


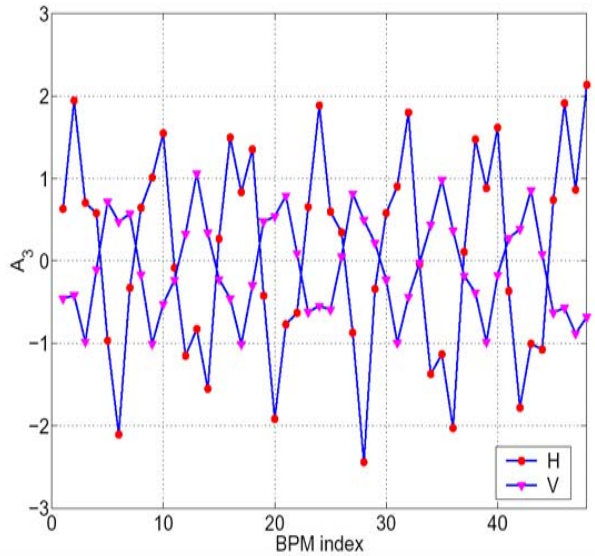


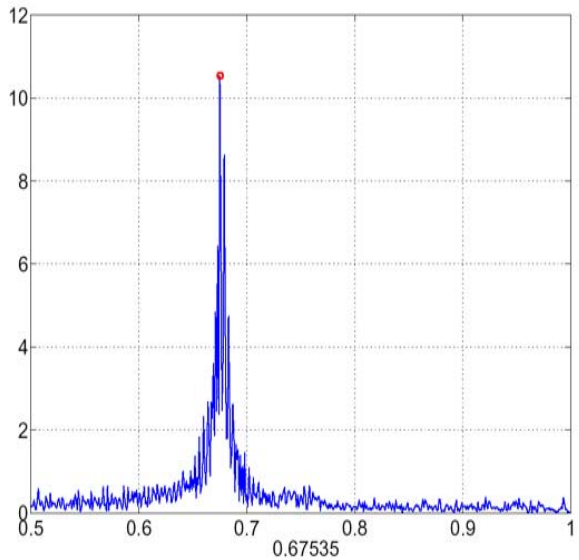
One of the two ‘plus’ betatron mode

Mode 3

Turn 2000 – 2999, M20
[0, 1, 2, 3, 4]



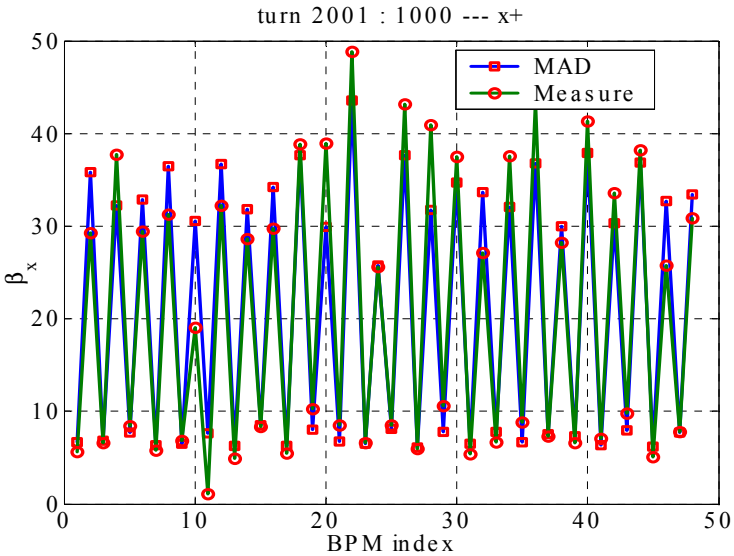


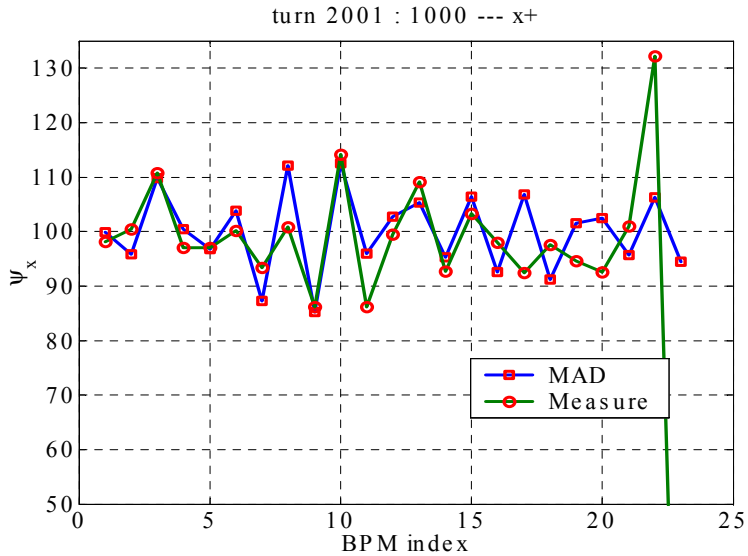


One of the two ‘minus’ betatron mode

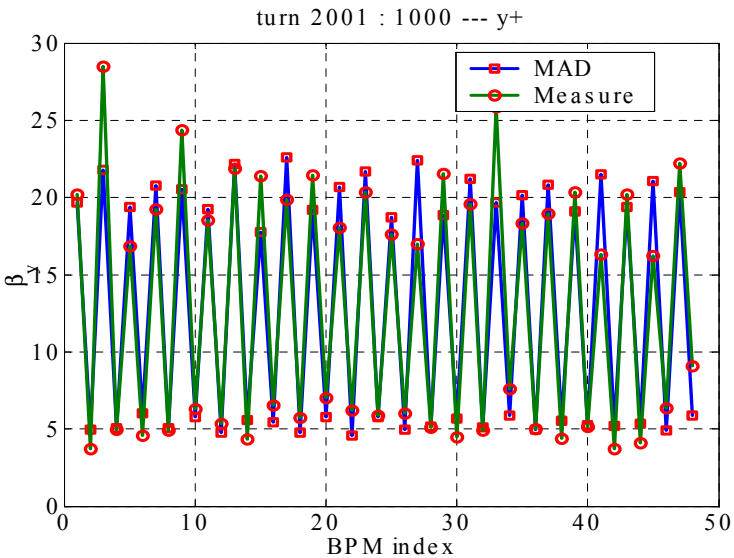
β & ψ

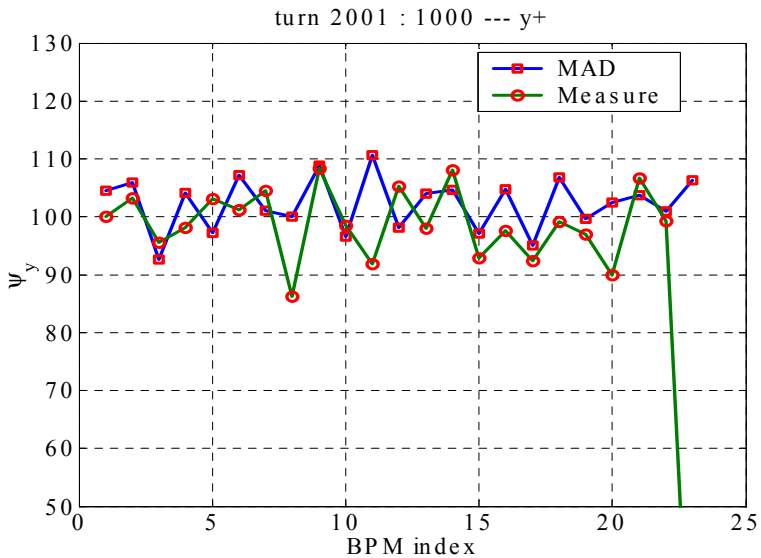
βx


turn 2001 : 1000 --- x+
MAD
Measure
β_x
BPM index


turn 2001 : 1000 --- x+
MAD
Measure
ψ_x
BPM index

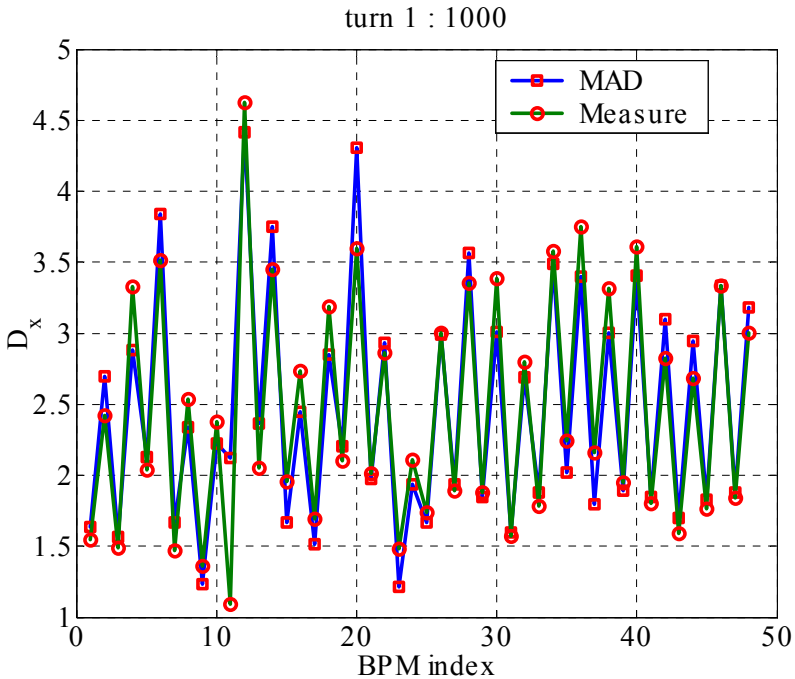
βy

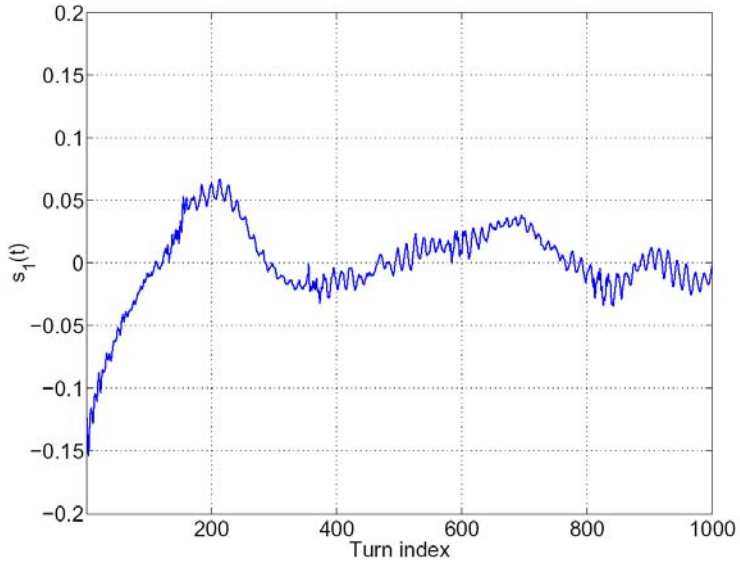

turn 2001 : 1000 --- y+
MAD
Measure
β_y
BPM index

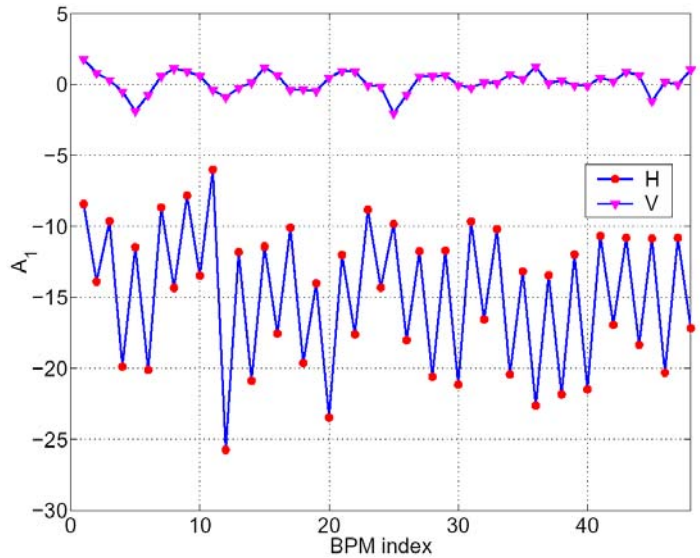

turn 2001 : 1000 --- y+
MAD
Measure
ψ_y
BPM index

Dispersion

Turn 1-1000, P5
[0, 1, 2, 20, 50]

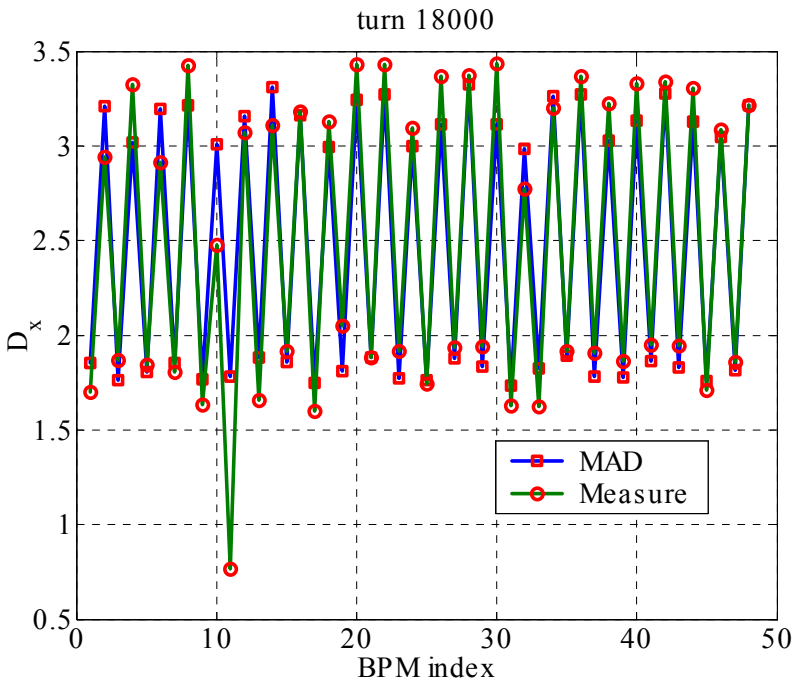


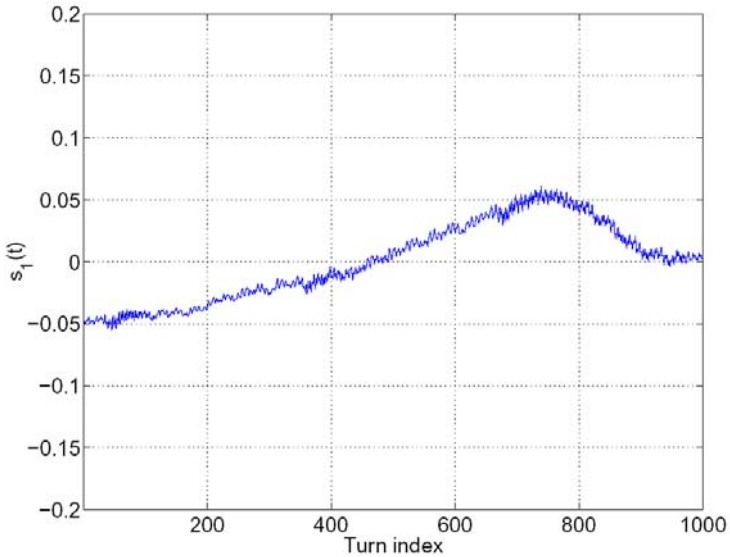


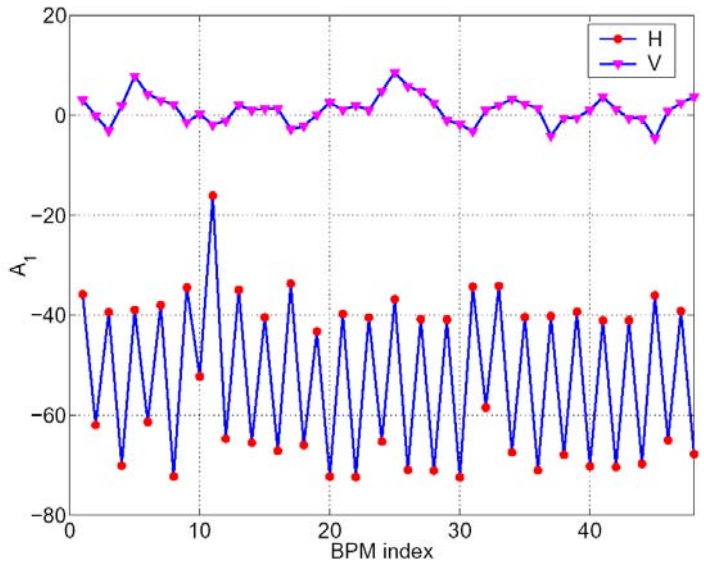


Dispersion

Turn 18001 – 19000
[0, 1, 2, 20, 50]





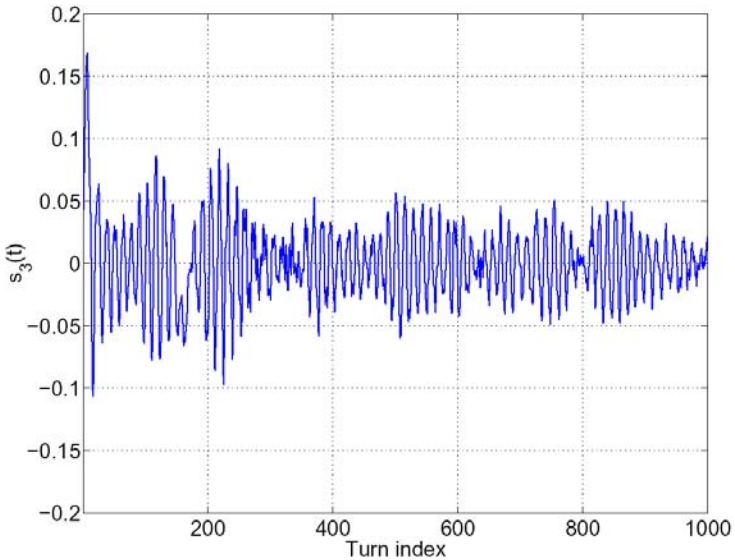


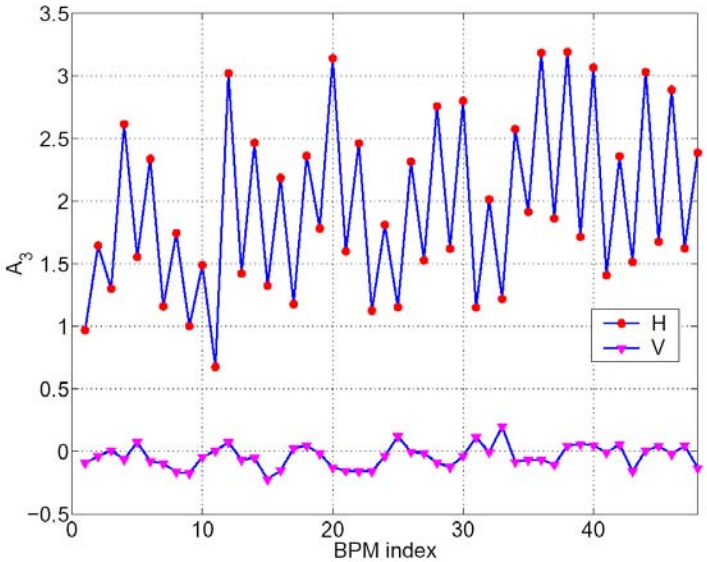
Other Modes

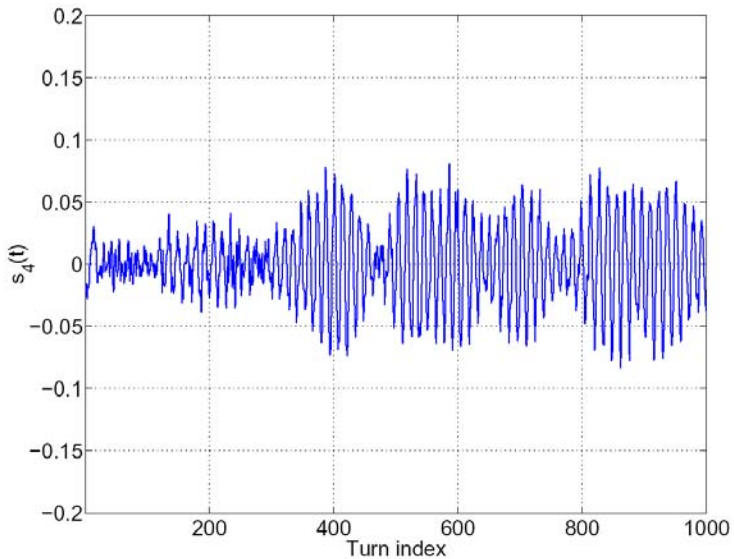
- There is no vertical instability mode observed.
- The evolution of some modes with special features.
- The contaminating modes.

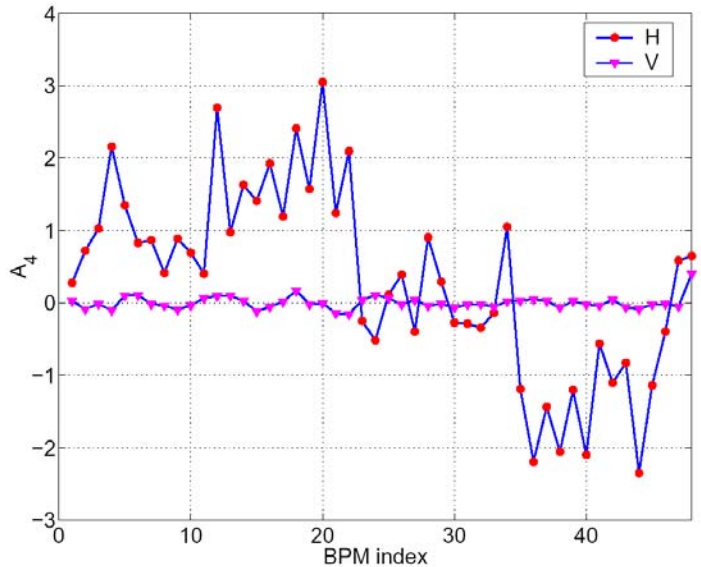
Turn 1 – 1000, M20

Other Modes

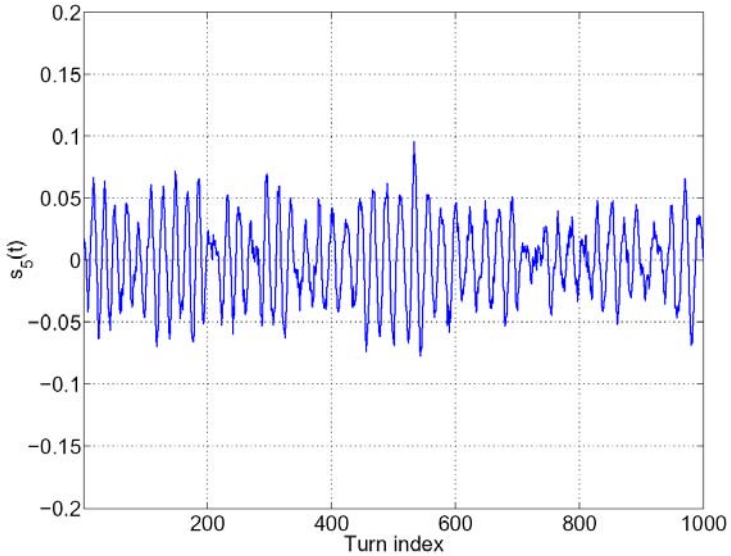


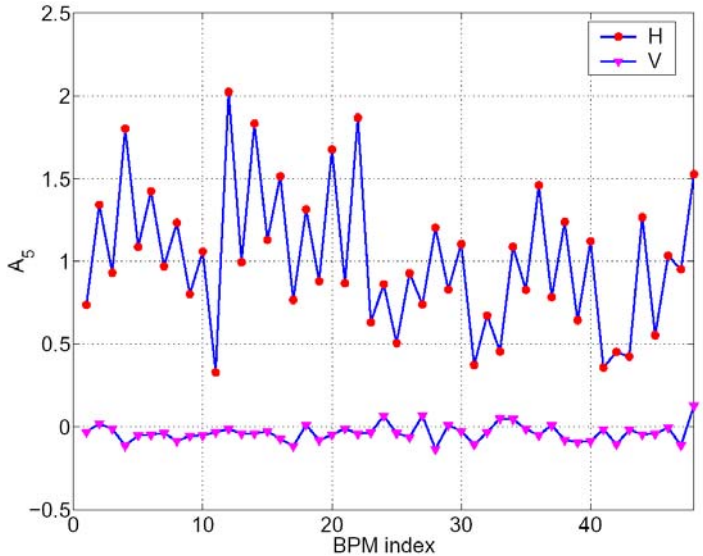


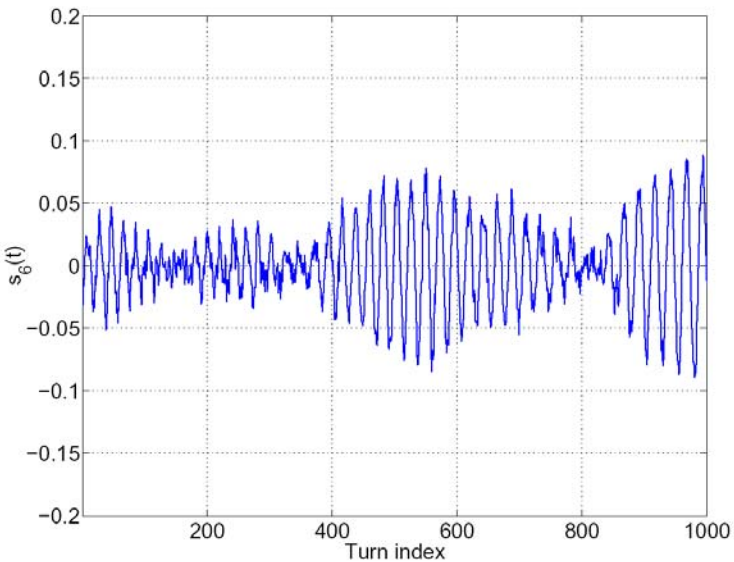


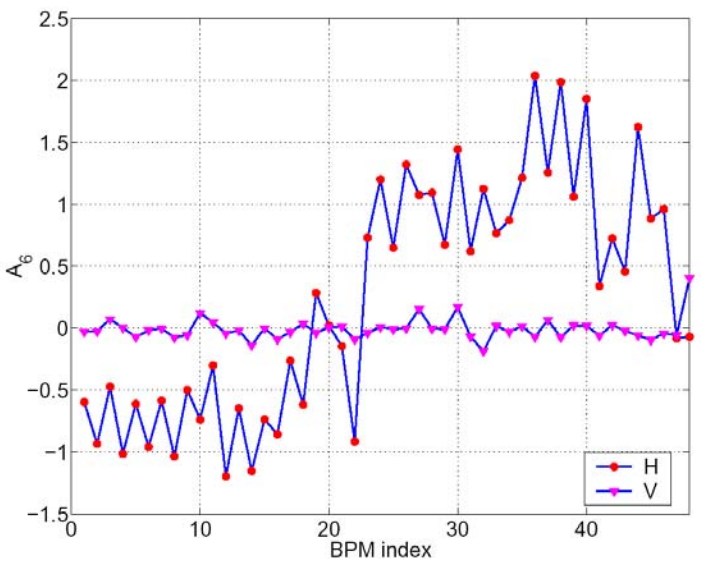


Turn 2000 – 2999, M20

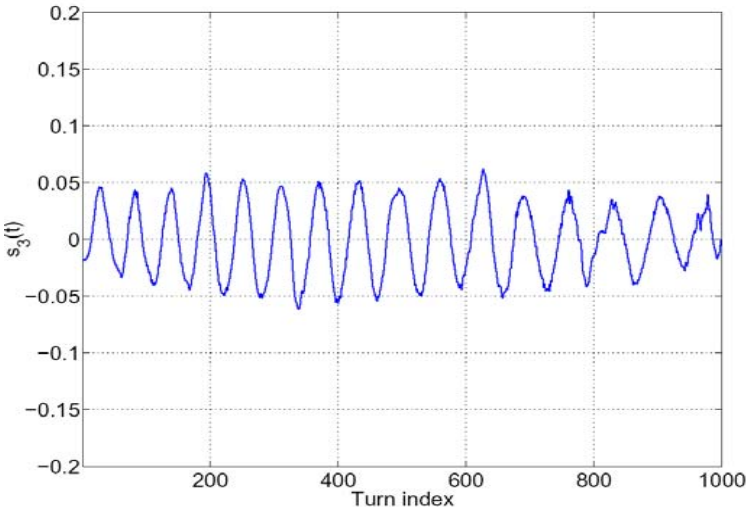


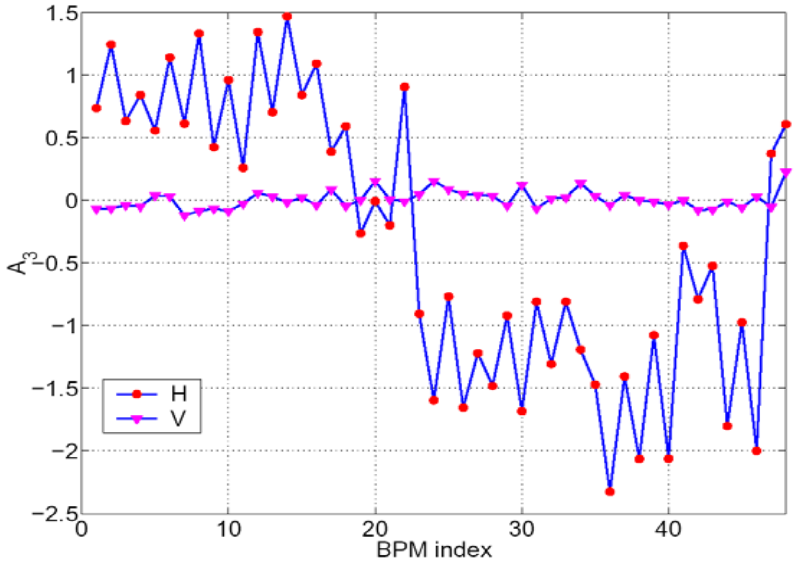


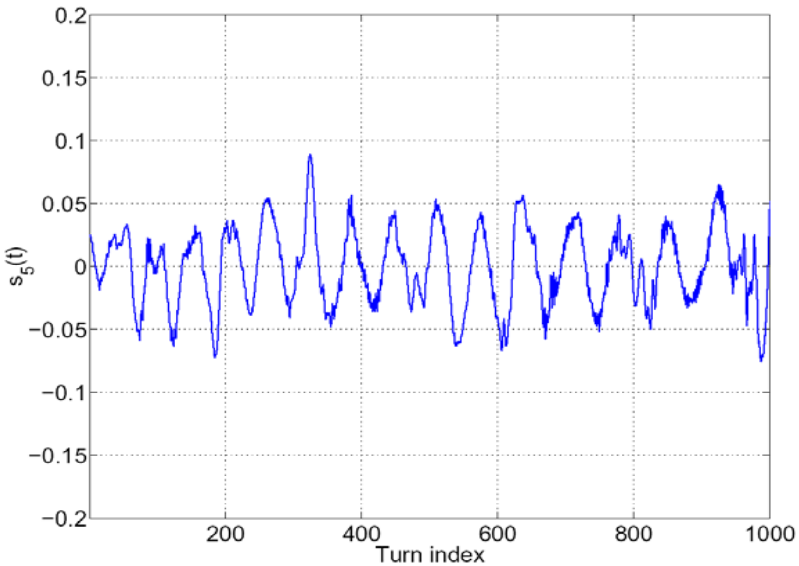


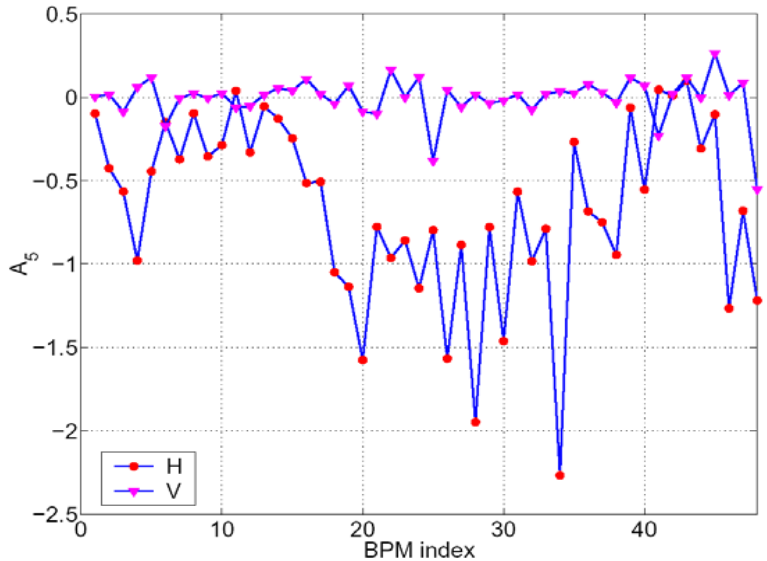


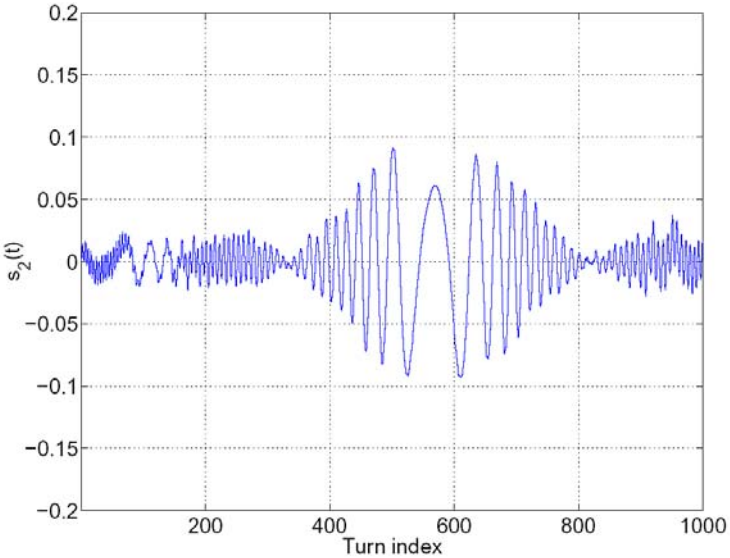
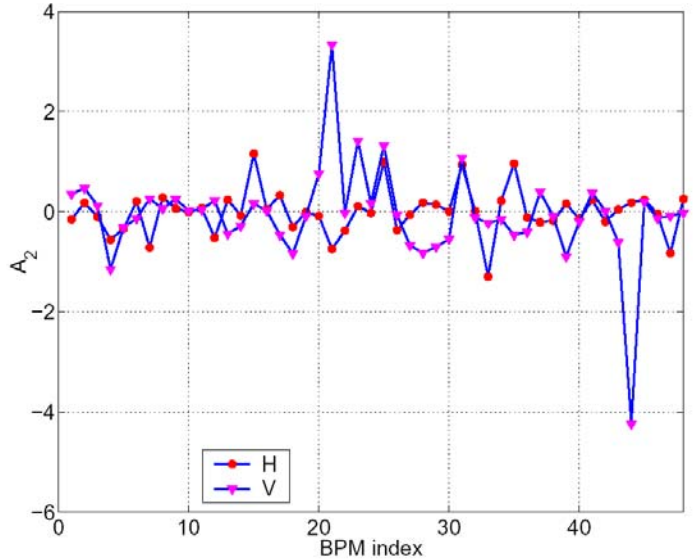
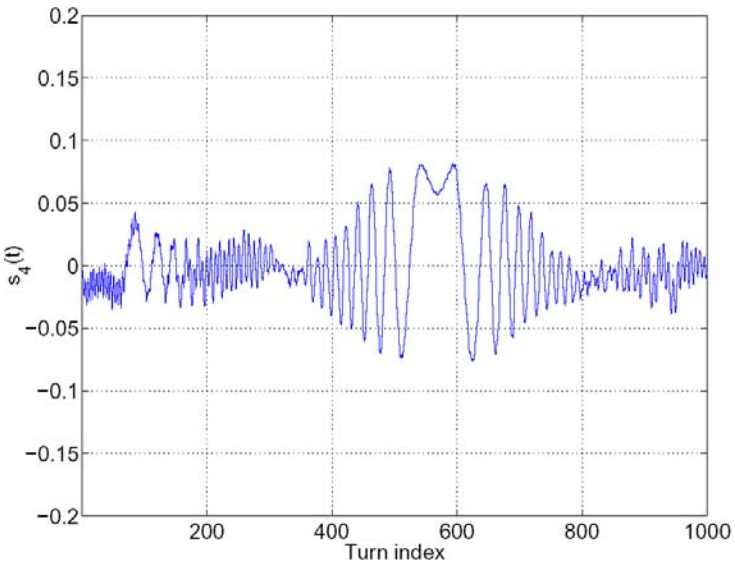
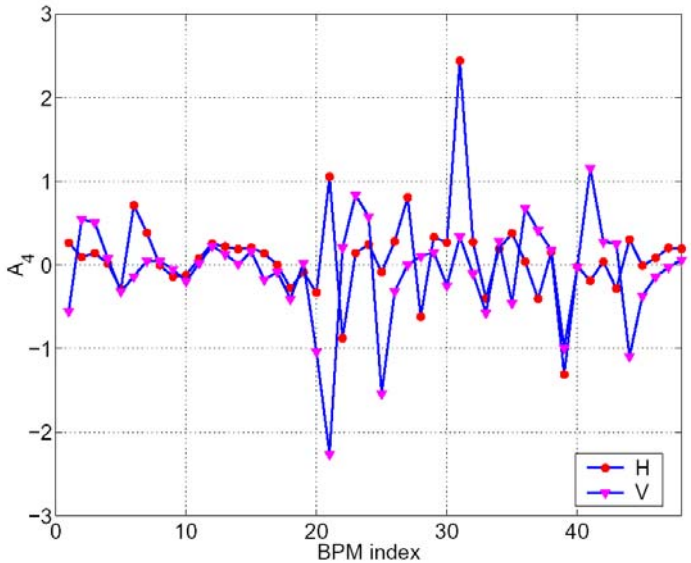
Turn 5001-6000, P5









Contaminating Modes

Turn 14001 – 15000, P5