Software Injection tests on Deepclean

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PEM (Acoustic) Injection Test (2020/06/11)

- PRM booth / PSL room (PRFPMI, Logbook)

- Start time: Jun 11, 2020 10:00 AM JST = 1275872418
- End time: Jun 11, 2020 04:20 PM JST = 1275895277
Acoustic injection to PR booth

Graph 1: Interferometer PSD [a.u.$^2$/Hz]
- Background Data
- $P_{\text{inj}}(f') = 4.9e-03$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 8.3e-04$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 2.3e-04$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 5.9e-05$ Pa$^2$/Hz

Graph 2: Sound PSD [Pa$^2$/Hz]
- Background Data
- $P_{\text{inj}}(f') = 4.9e-03$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 8.3e-04$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 2.3e-04$ Pa$^2$/Hz
- $P_{\text{inj}}(f') = 5.9e-05$ Pa$^2$/Hz
Response to injection in PSL room and PR booth
Locked + No Injection

- We need to choose “locked” and “no injection” time segments.
- Start: Jun 11, 2020 15:21 JST = 1275891708
  (K-K1_C-1275891680-32.gwf)
- End: Jun 11, 2020 15:29 JST = 1275892188
  (K-K1_C-1275892160-32.gwf)
- Data quality checked.
Data Preparation

- GPS time: 1275891680 ~ 1275892160
- Strain data used: K1:CAL-CS_PROC_C00_STRAIN_Double_DQ
- PEM channel used: K1:PEM-MIC_PSL_TABLE_PSL4_Z_OUT_Double
- Training time: 1275891680 ~ 1275892160 (480-second)
- Cleaning time: 1275891680 ~ 1275892160 (480-second)
- We have a gwf for noise subtraction:
  K-K1_NOISE_INJ_BGRD-1275891680-480.gwf
Next Step

- We will produce mock waveform by injection sinusoidal continuous waves,
  \[ s(t) = A \times \sin(2\pi ft + \phi) \]

- We could generate a gwf with injected waveform for DeepClean.

- Comparison to Independent Component Analysis (ICA)
References

- KAGRA / CAL
- KAGRA / DET
- KAGRA / DataQuality
- KAGRA / PEM
Data Quality Check
(1275891680 ~ 1275892160)
Data Quality Check

Data Quality Flags: 1275891680 ~ 1275891712

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow

680 685 690 695 700 705 710
+1.2758910000 x 10⁹
Data Quality Check

Data Quality Flags: 1275891712 ~ 1275891744

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow

- key
- key
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- key
- key
Data Quality Check

Data Quality Flags: 1275891744 ~ 1275891776

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
- key
- key
- key
- key
- key
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- key
- key
Data Quality Check

Data Quality Flags: 1275891776 ~ 1275891808

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow

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Data Quality Check

Data Quality Flags: 1275891840 ~ 1275891872

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow

40 45 50 55 60 65 70

+1.2758918000 × 10^9
Data Quality Check

Data Quality Flags: 1275891872 ~ 1275891904

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
- key
- key
- key
- key
- key
- key

+1.275891000 × 10^9
Data Quality Check

Data Quality Flags: 1275891904 ~ 1275891936

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
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+1.2758919000 x 10^9
Data Quality Check

Data Quality Flags: 1275891968 ~ 1275892000
Data Quality Check

Data Quality Flags: 1275892000 ~ 1275892032
Data Quality Check

Data Quality Flags: 1275892032 ~ 1275892064

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
- key
- key
- key
- key
- key
- key

+1.2758920000 \times 10^9
Data Quality Check

Data Quality Flags: 1275892064 ~ 1275892096

- Continuous_injection
- DET_injection
- Burst_injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
- key
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- key
- key

+1.2758920000 × 10^9
Data Quality Check

Data Quality Flags: 1275892096 ~ 1275892128
Data Quality Check

Data Quality Flags: 1275892128 ~ 1275892160

- Continuous injection
- DET_injection
- Burst injection
- CBC_injection
- Stochastic_injection
- ETMY_overflow
- key
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