

SSP Assignment-4

- Srihari Bandarupalli
- 2021112006

QUESTION 1

a)

ZFF, also referred to as zero frequency filtering, is primarily employed in the identification of epochs within an audio signal. This technique involves removing the DC component or zero-padding in order to filter out unwanted frequencies. Unlike higher frequencies, which are affected by vocal-tract resonances, zero frequency remains unaffected by such characteristics.

b)

Time-scale modification (TSM) is an audio processing technique that allows altering the speed or duration of an audio signal without affecting its pitch. TSM preserves the perceived pitch by intelligently modifying the time domain while minimizing artifacts and maintaining the audio's natural quality.

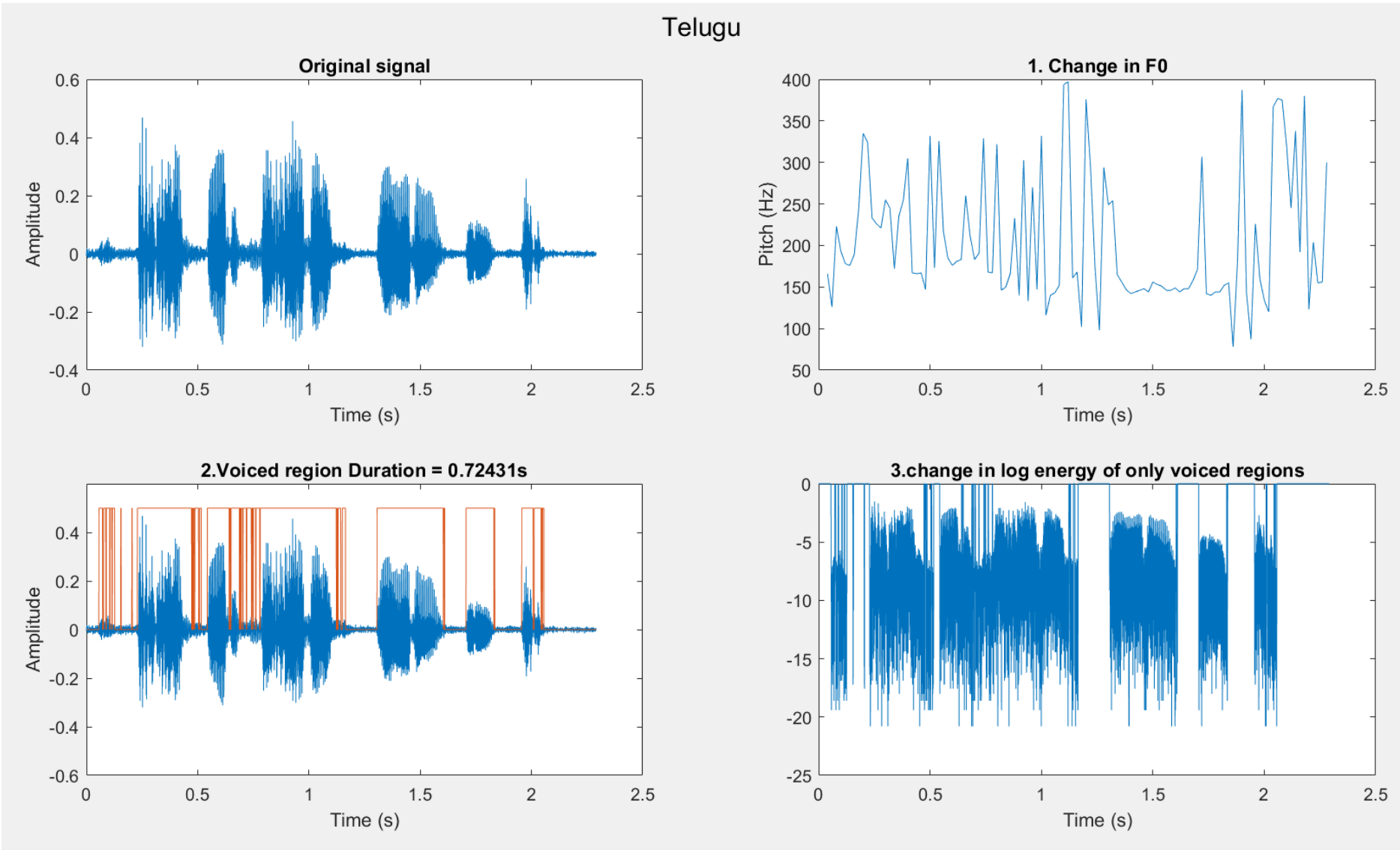
QUESTION 2 and QUESTION 3

⇒Code_2_3.ipynb

QUESTION 4

⇒ Code_4.m

Telugu



"Telugu"

"1.avg f0 = 205.1327Hz"

"2.Voiced region Duration = 0.72431s"

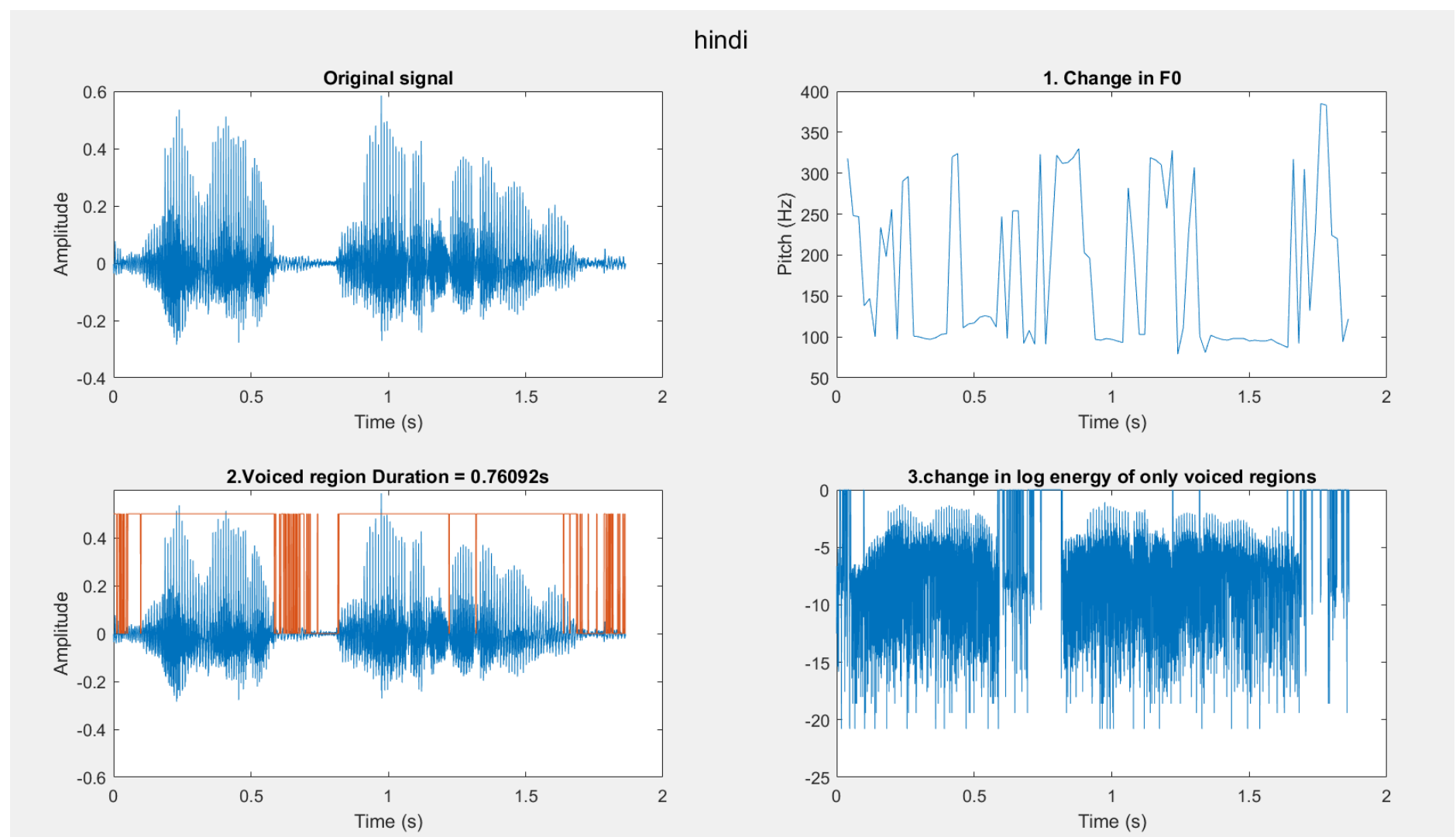
"4.avg duration between successive VOPs = 0.066061 s"

"5.avg duration between F0 and VOP = 0.0525 s"

"6.Avg Duration Tilt = 0.73824"

"7.Avg Amplitude Tilt = -0.072573"

Hindi



"hindi"

"1.avg f0 = 175.5435Hz"

"2.Voiced region Duration = 0.76092s"

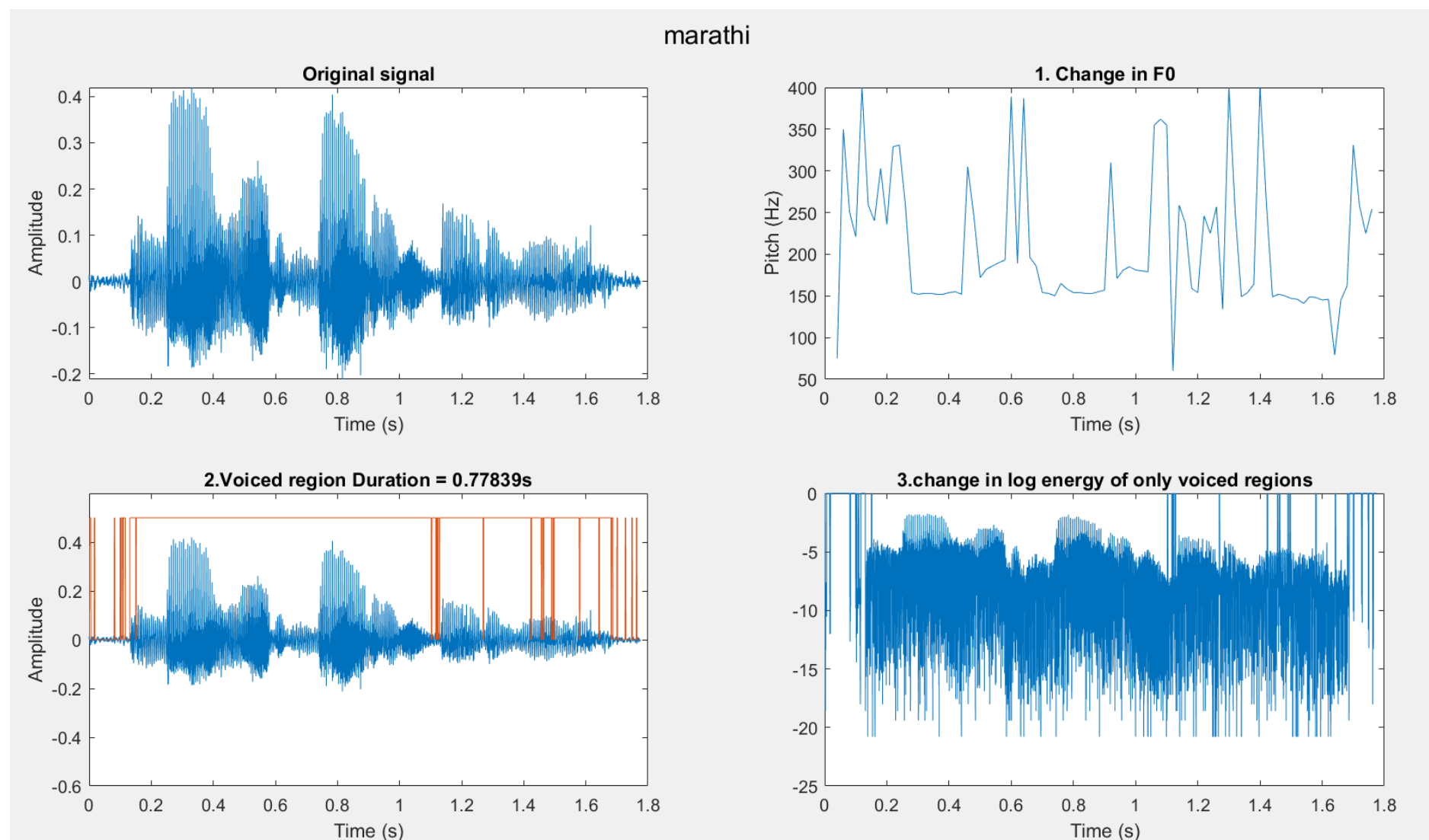
"4.avg duration between successive VOPs = 0.064444 s"

"5.avg duration between F0 and VOP = 0.020741 s"

"6.Avg Duration Tilt = -0.93527"

"7.Avg Amplitude Tilt = -0.024032"

Marathi



"marathi"

"1.avg f0 = 207.5287Hz"

"2.Voiced region Duration = 0.77839s"

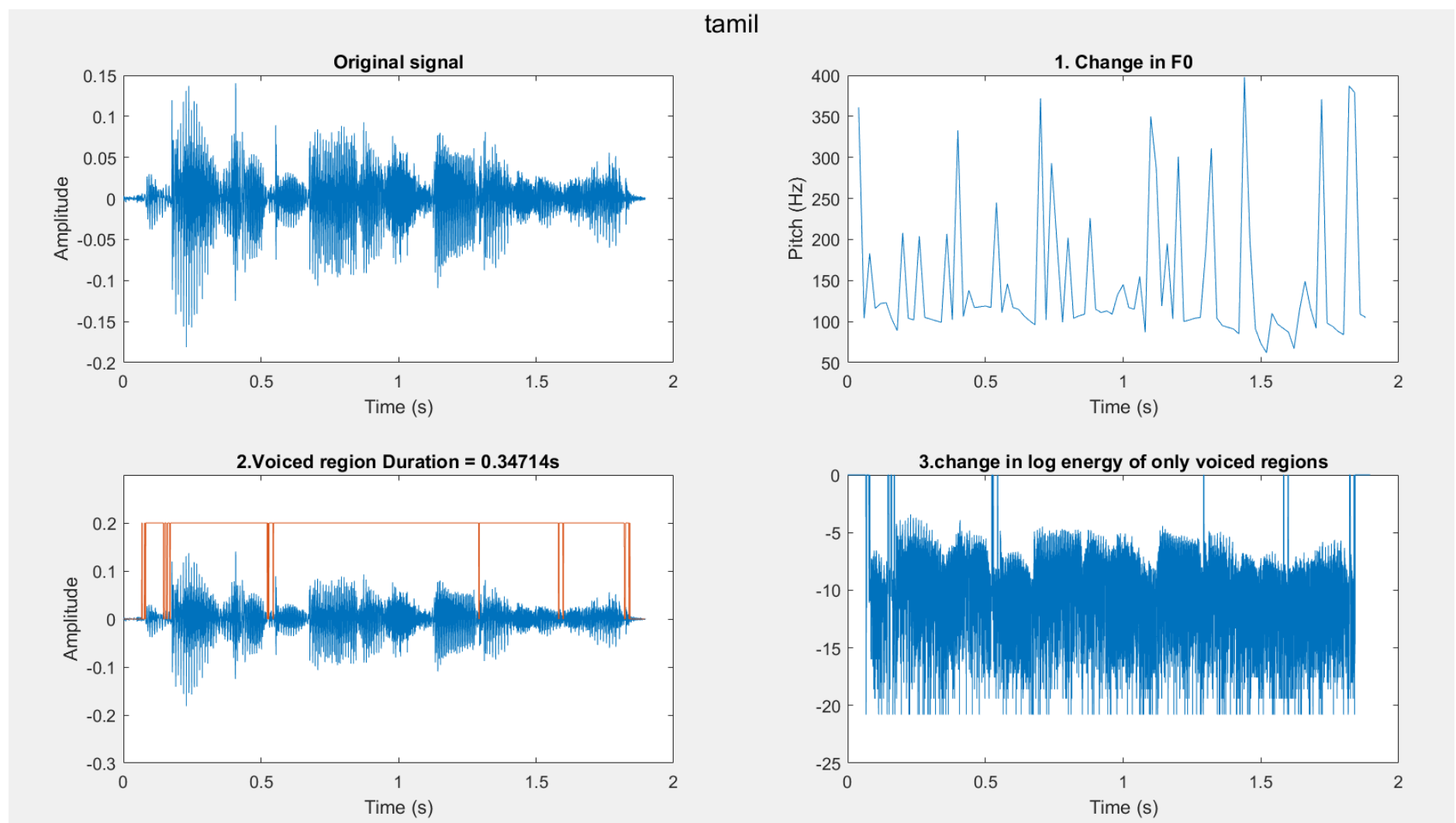
"4.avg duration between sucessive VOPs = 0.068333 s"

"5.avg duration between F0 and VOP = 0.016667 s"

"6.Avg Duration Tilt = -1.3806"

"7.Avg Amplitude Tilt = -0.05332"

Tamil



"tamil"

"1.avg f0 = 148.6559Hz"

"2.Voiced region Duration = 0.34714s"

"4.avg duration between successive VOPs = 0.0696 s"

"5.avg duration between F0 and VOP = 0.027692 s"

"6.Avg Duration Tilt = -0.14133"

"7.Avg Amplitude Tilt = -0.033329"

Observations

- Average Fundamental Frequency (f0):** Telugu and Marathi speakers have higher pitch, while Hindi and Tamil speakers have lower pitch.
- Voiced Region Duration:** Marathi has the longest voiced region, while Tamil has the shortest, reflecting differences in speech duration.
- Average Duration Between Successive VOPs:** Similar across speakers, with minor variations, indicating relatively consistent pacing.
- Average Duration Between f0 and VOP:** Telugu has the longest duration, while Marathi has the shortest, reflecting speaking rate differences.