



# AIM (Asynchronous Interpolation Model)

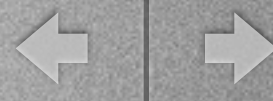
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- **Asynchronous Interpolation Model (AIM)**
- **AIM on Formant**
- **AIM in LSFs**
- **AIM on Harmonics**
- **The problems**

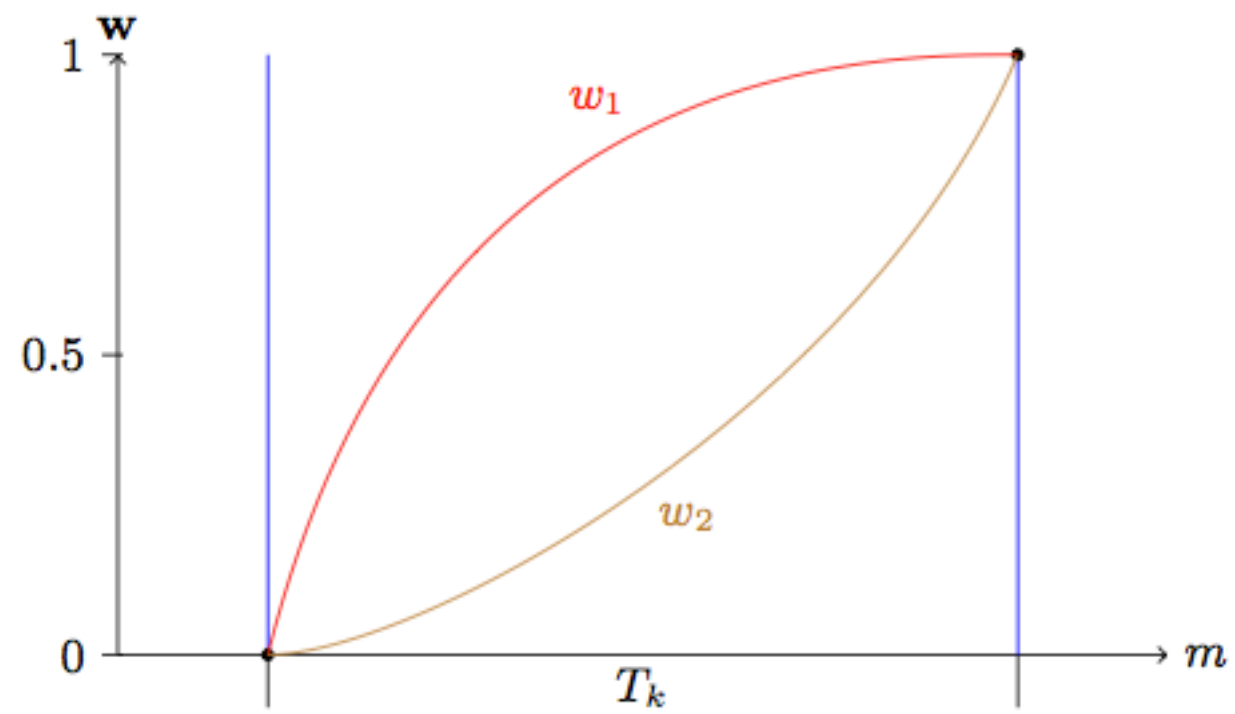
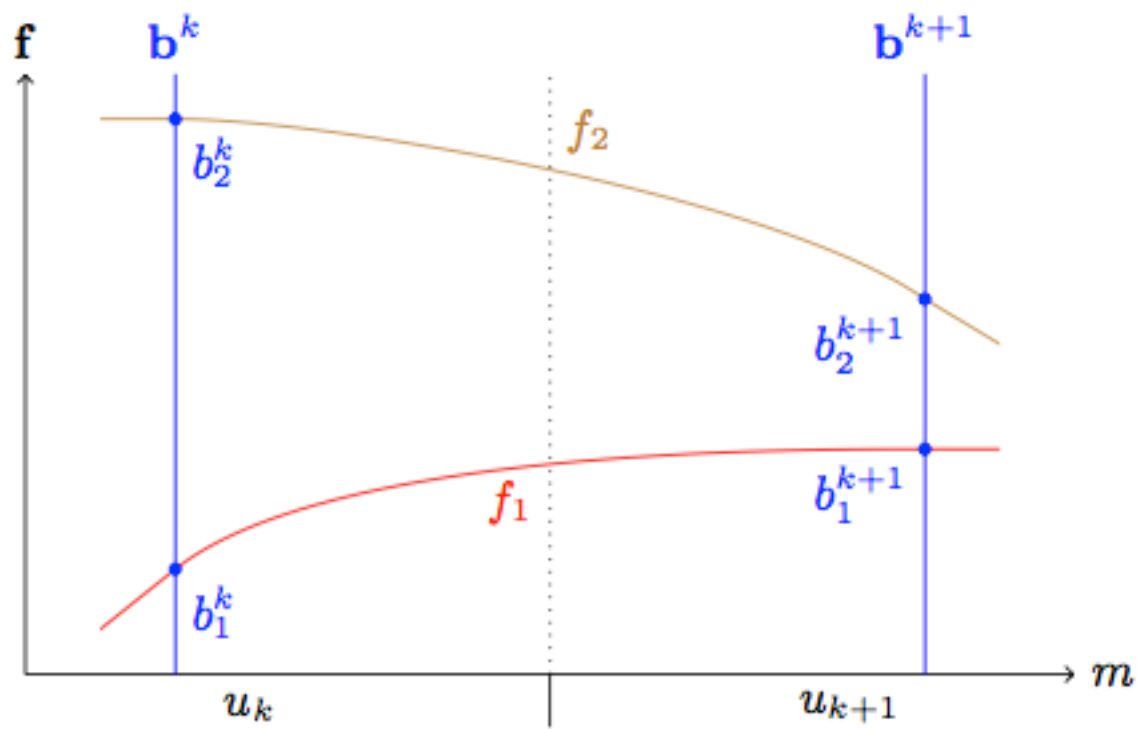




# AIM

- Events: phonemes, allophones, etc
- If no significant event occurs in between the selected events, we can interpolate them
- The core idea of AIM: describe speech region by varying influence of preceding and following events.

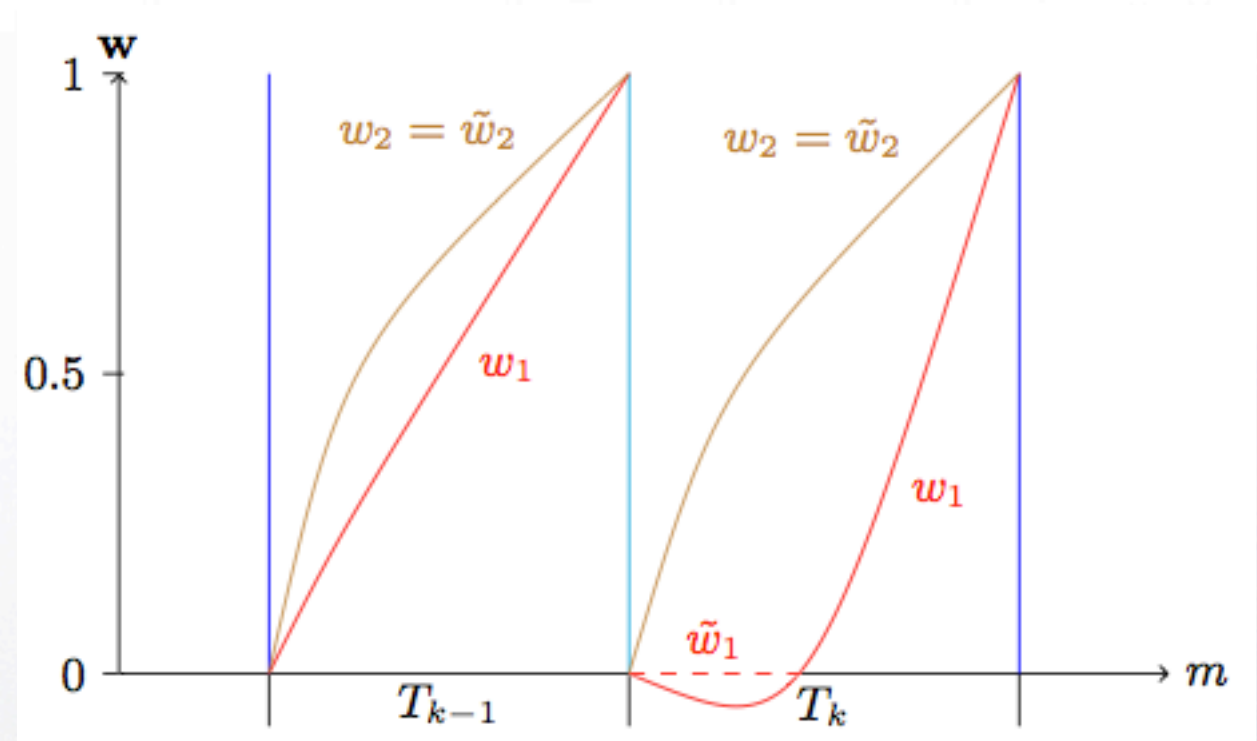
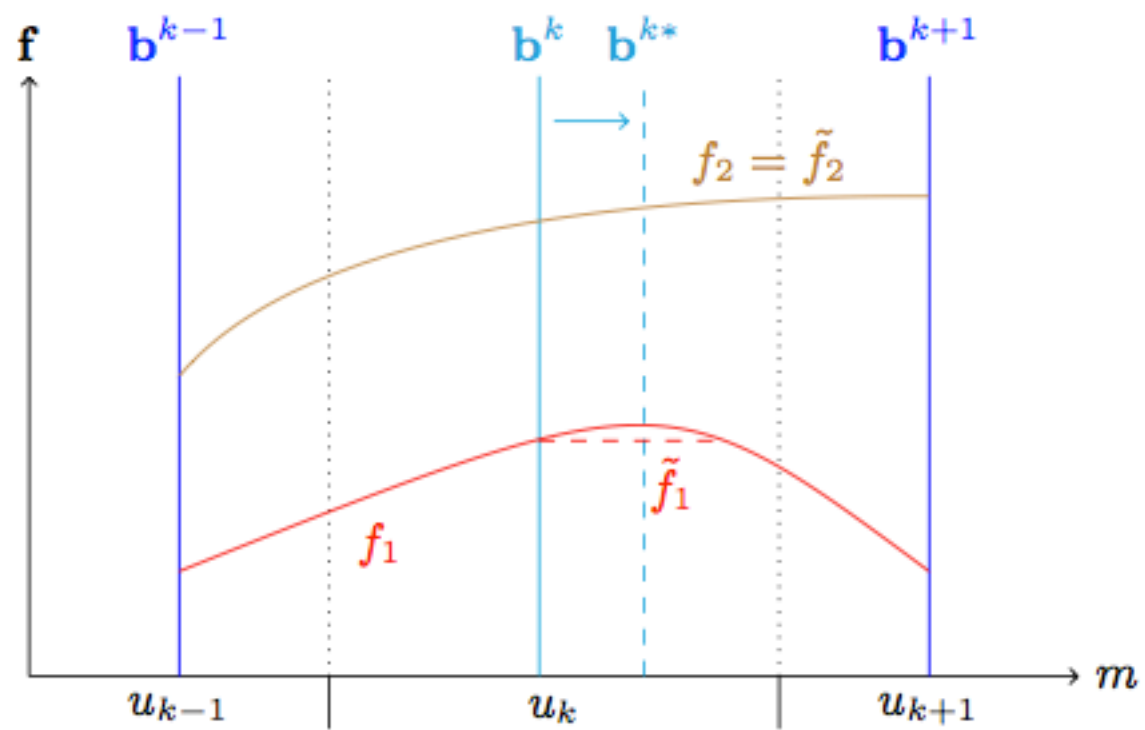
# AIM



[Kain2010]

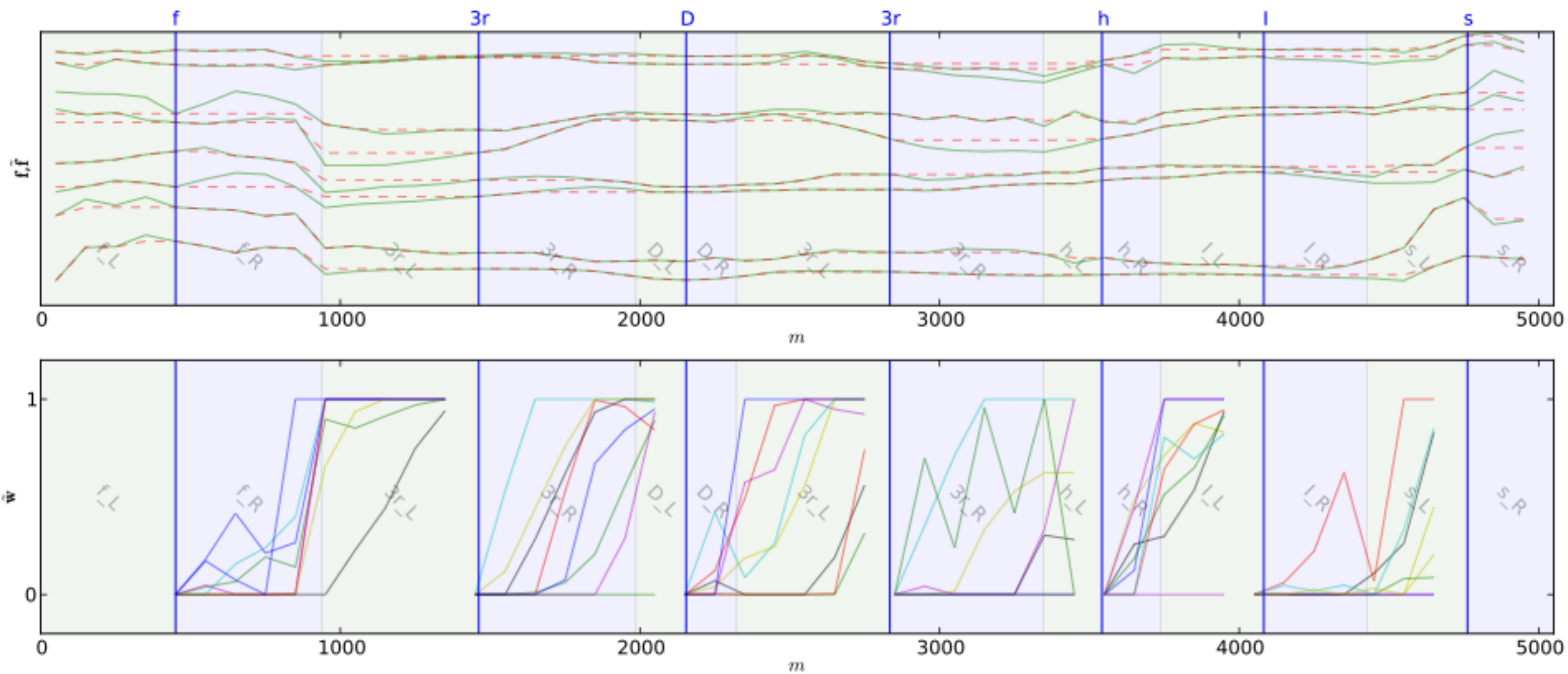


# AIM



[Kain2010]

# AIM

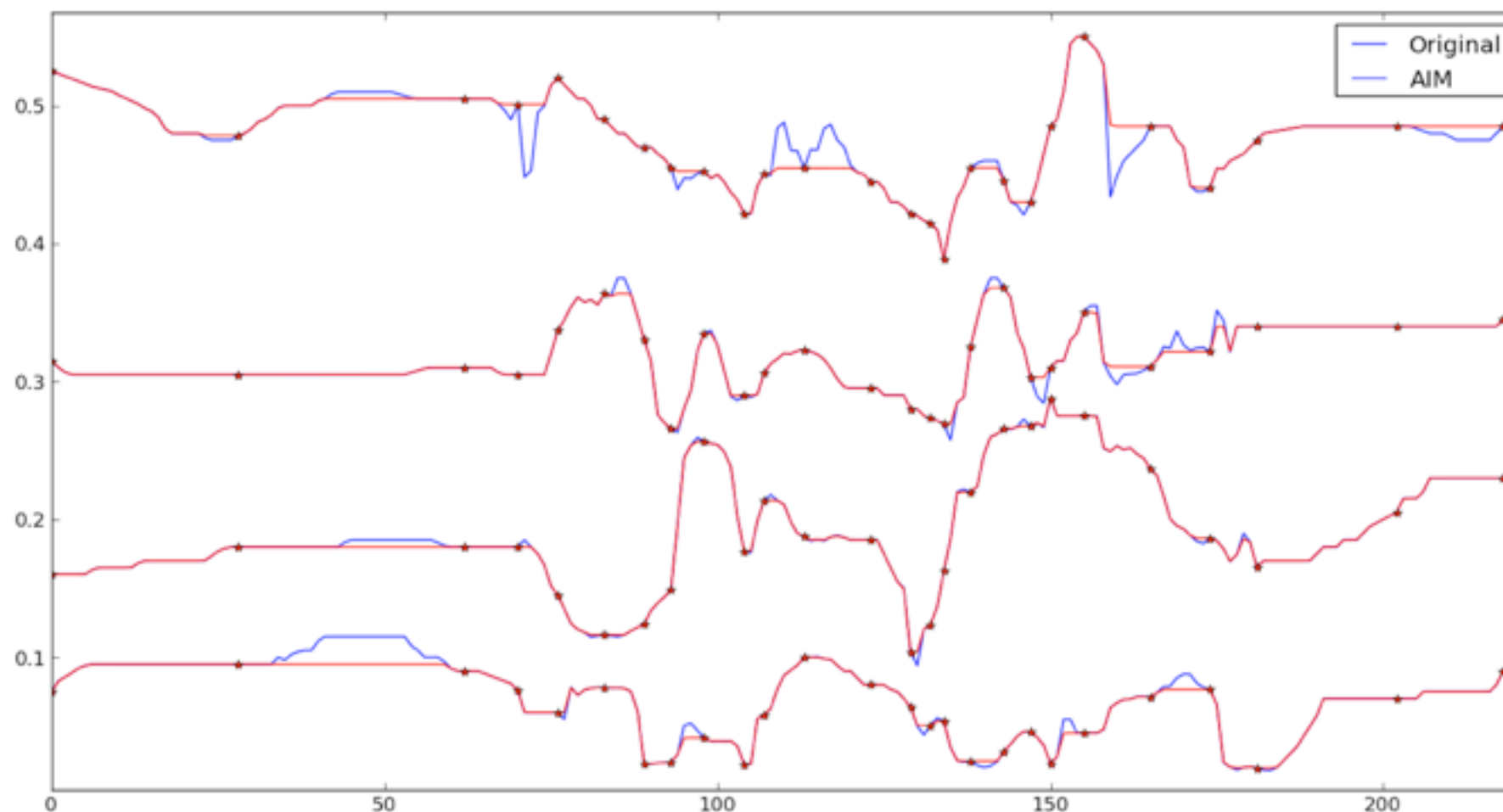


[Kain2010]



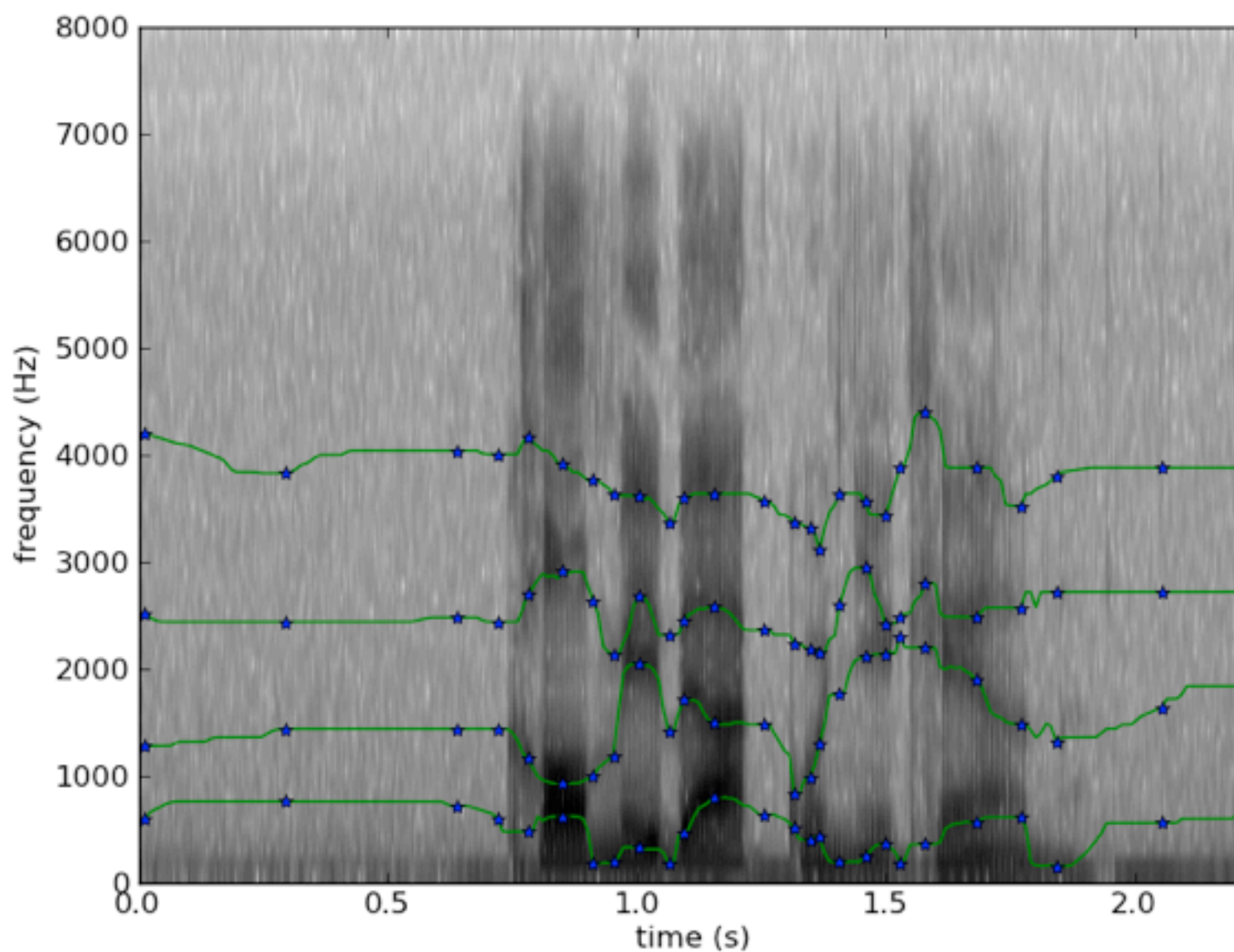


# AIM on formants





# AIM on formants







# AIM on formants

- Pros:
  - Features (Formant Frequencies) are highly interoperable
  - Can produce highly intelligible speech
- Cons:
  - Not high-quality (regarding naturalness)
  - Does not reflect all the details of the speakers



# AIM on LSFs

- The same procedure can be applied on other features
- We selected to use Line Spectral Features
- Okay interpolation property





# AIM on LSFs

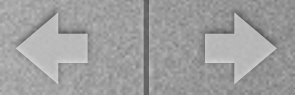
- The same procedure can be applied on other features
- We selected to use Line Spectral Features (LSFs)
- Fair interpolation property and Fair quality



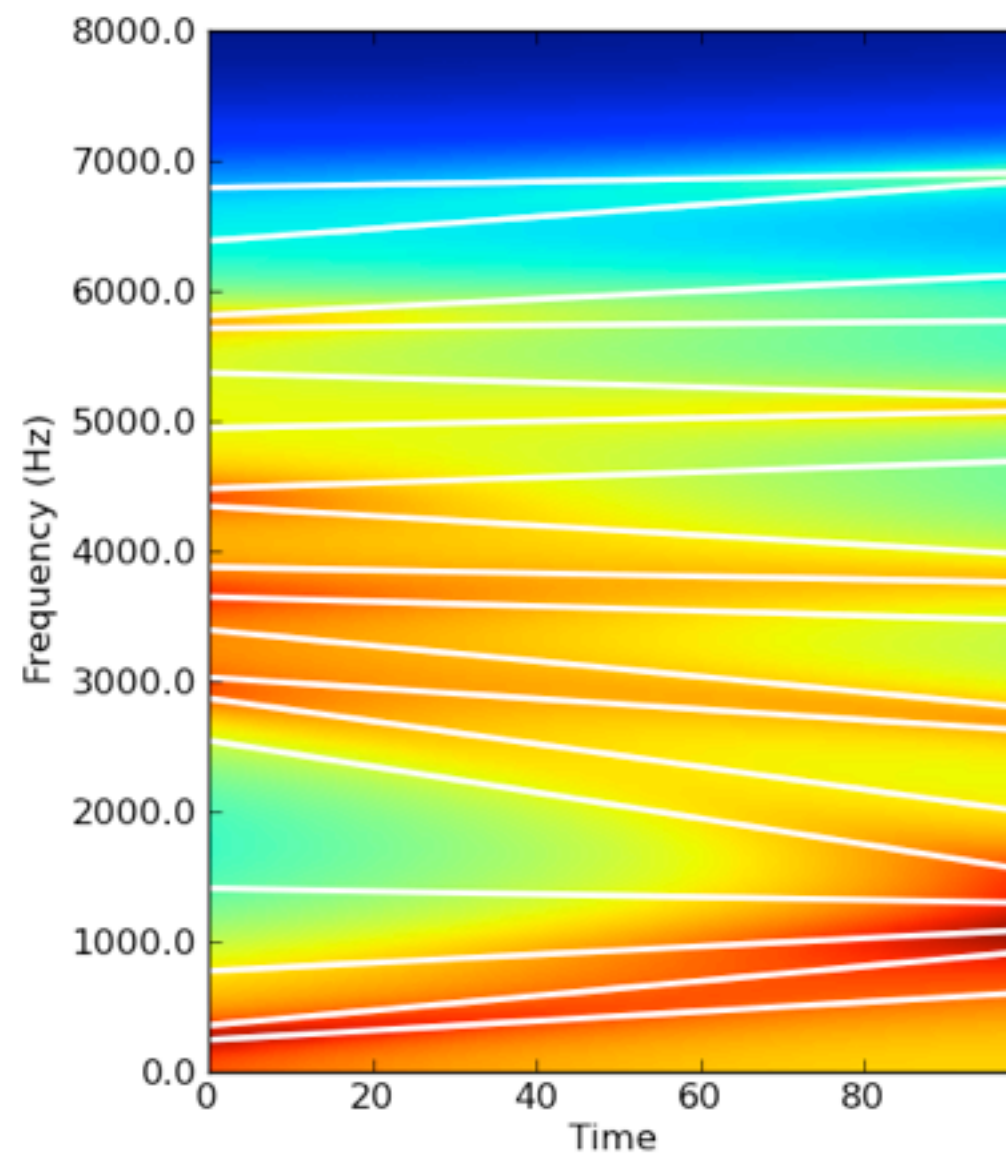
# AIM on LSFs

- Pros:
  - Robustness (Stable interpolated filters)
  - Fair interpolation property
  - Straight-forward
- Cons:
  - Interpolation does not always work
  - Quality limit: Vocoder Quality



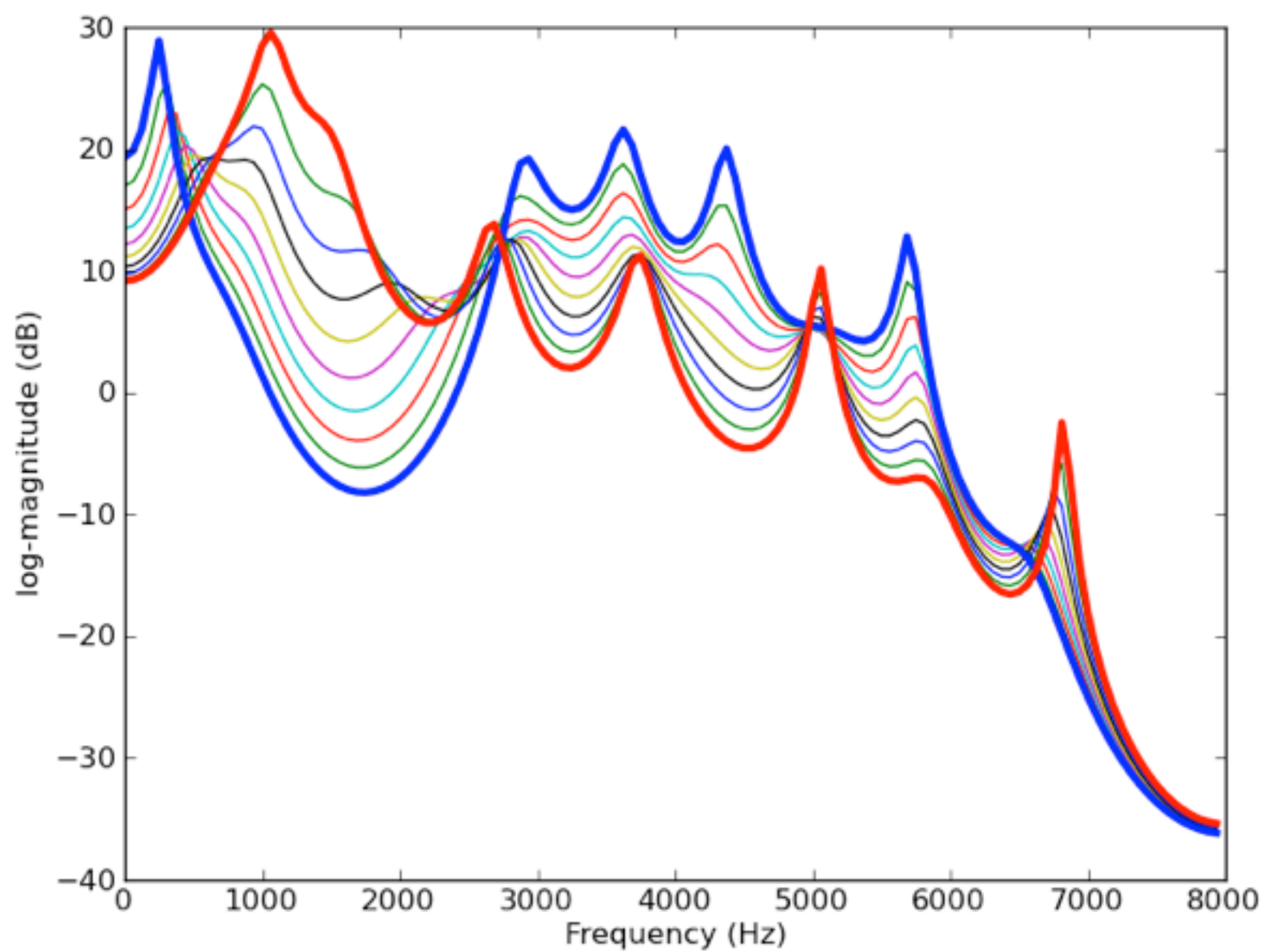


# AIM on LSFs

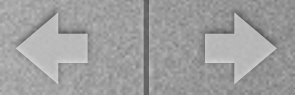




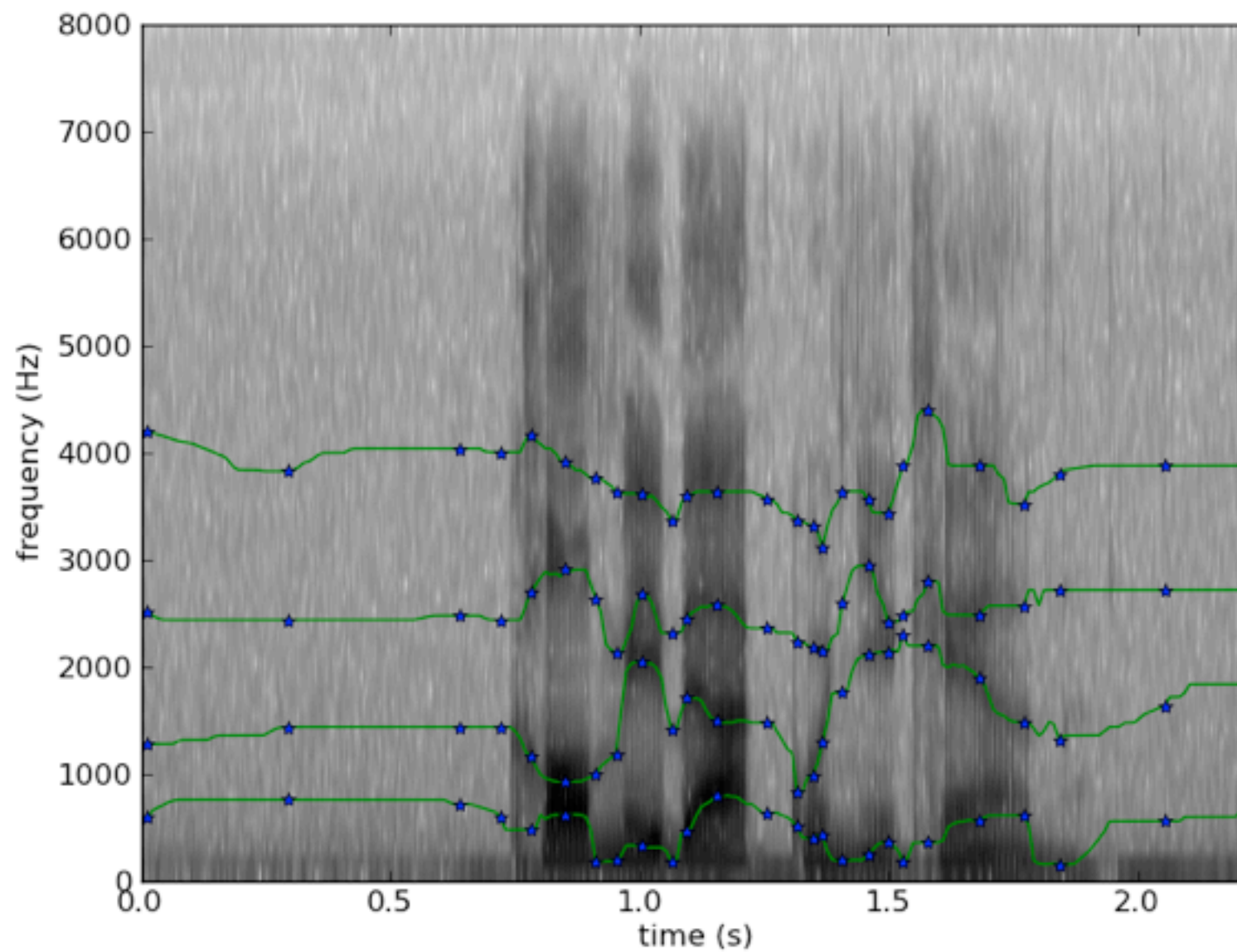
# AIM on LSFs







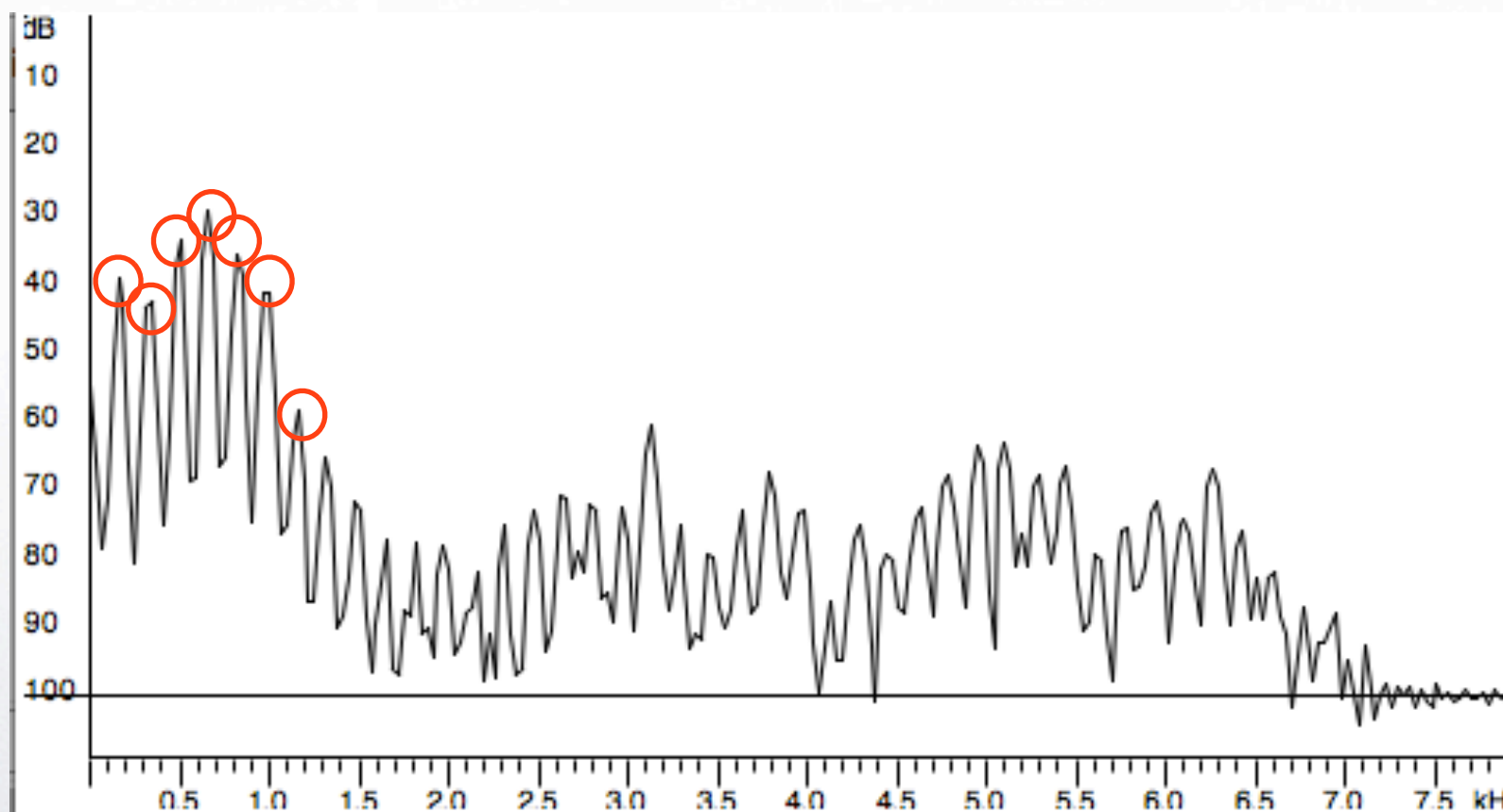
# AIM on Harmonics





# Conclusion

- Harmonic Vocoder

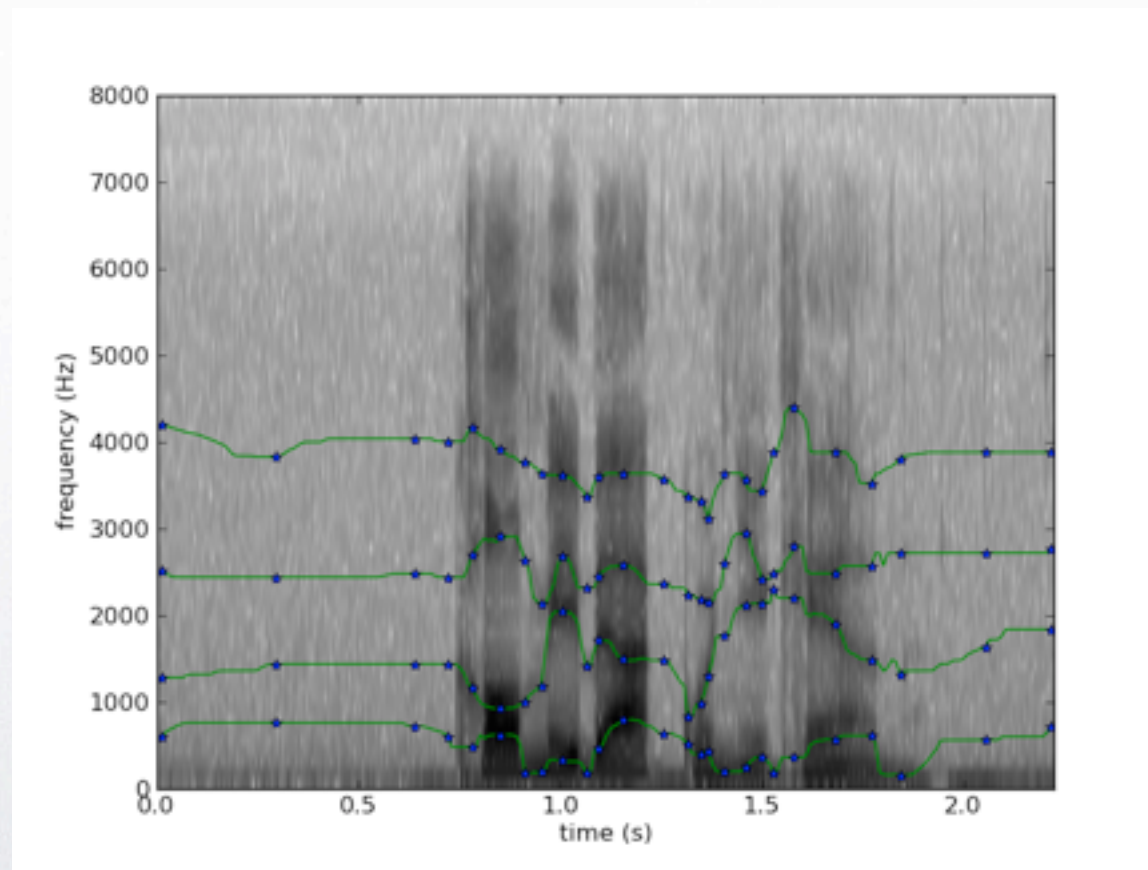






# Harmonic

- Use the AIM on Formants as a “cue” or guide to modify the Harmonic spectrum





# Harmonic

- Pros:
  - Potentially high quality
  - keeps most of speaker information
- Cons:
  - Repeating a frame results in low-quality speech
  - Hard to generate natural-like speech with current technology





# Future Work

- Problems:
  - LSFs: Resolve the interpolation (One solution is Pole Interpolation)
  - Harmonics: Resolve low quality of frame repetition
- Optimizing weights
- Optimizing Event locations



# Question?





# References

- [1] Kain A. et al, “COMPRESSION OF LINE SPECTRAL FREQUENCY PARAMETERS USING THE ASYNCHRONOUS INTERPOLATION MODEL”, 2010.