

Project 2  
The Iterative Method for Interpolation Distortion

The Iterative algorithm is given below:

$$x_n(t) = \lambda \cdot PS x(t) + (I - \lambda \cdot PS)x_{n-1}(t)$$

where  $\lambda$  is called the relaxation parameter and determines the rate of convergence (typically for S&H distortion around the Nyquist,  $\lambda$  is between 0 and 2). P and S are the lowpass filtering and the sampling operators. In this project S is uniform sampling with either S&H or linear interpolation.

- 1- Simulate the iterative method using Mathcad for
  - i- Sample-and-hold distortion
  - ii- Linear Distortion
  - iii- Extra Credit: try the feedback implementation of the iterative method and compare it to the iterative method
- 2- In your simulations use FIR or IIR and then try DFT for the lowpass operator P and compare the results with each other and then with the modular method.
- 3- Your report should contain the following parts:
  - i. An abstract of about 50 words
  - ii. An introduction consisting of a statement of the problem, its relevance and history with references to previous works.
  - iii. Solution and algorithms
  - iv. Simulation results and discussions
  - v. Conclusion
  - vi. References
  - vii. Appendix: Mathcad codes

## Reference

F Marvasti, An iterative method to compensate for interpolation distortion, IEEE Trans ASSP, vol3, no1 , pp 1617-1621, 1989.