Project 6
Demodulation of DM and SDM and Applications in A/D and D/A Conversion

DM and SDM are used for A/D and D/A conversion. If more intelligent reconstruction techniques are used for decoding, either signals with higher bandwidths can be digitized or simpler circuitry can be utilized.

1- Simulate the decoder of an analog asynchronous DM using the iterative method on the corresponding nonuniform samples generated from DM (using optimized parameters). How much bandwidth compression can be achieved if the iterative method is used as opposed to the traditional decoding?

2- By quantizing the time axis of the output of the DM decoder, we can get a sort of synchronous DM. Repeat part 1 for digital DM.

3- SDM is a modification on the DM and is widely used in ADC. By using the inverse system approach simulate the iterative method and show that the SNR can improve significantly. Try different types of filters in your simulations.

4- Extra Credit: Try more than two levels for the SDM quantization and extend the work to DPCM and ADPCM.

5- 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

References
1- F Marvasti, Nonunifrom Sampling: Theory and Practice, Kluwer, 2001.
2- M Gamshadzahi, MSc thesis, Illinois Institute of Technology, 1988.
3- Avideh Zakhor, Sigma Delta Modulator,