DPCM (Differential Pulse Code Modulation)

Young W. Lim

October 18, 2013

DPCM Equations (1)

DPCM Principle

- $e(nT_s) = m(nT_s) - \hat{m}(nT_s)$
- $e_q(nT_s) = e(nT_s) + q(nT_s)$
- $m_q(nT_s) = \hat{m}(nT_s) + e_q(nT_s)$

- $m_q(nT_s) = \hat{m}(nT_s) + e(nT_s) + q(nT_s)$
  $[e(nT_s) = m(nT_s) - \hat{m}(nT_s)]$
- $m_q(nT_s) = m(nT_s) + e_q(nT_s)$

DPCM Equations (2)

- $m_q(nT_s) = \hat{m}(nT_s) + e(nT_s) + q(nT_s)$
  $[e(nT_s) = m(nT_s) - \hat{m}(nT_s)]$
- $m_q(nT_s) = m(nT_s) + e_q(nT_s)$

$m_q(nT_s)$ quantized signal at the prediction filter
differs from $m(nT_s)$by the quantization error $q(nT_s)$
the avarage power of the prediction error $e_q(nT_s)$
smaller than the average power of $m_q(nT_s)$
the number of levels of the quantizer also reduces

Reference

[1] S. Haykin, M Moher, “Introduction to Analog and Digital Communications”, 2ed