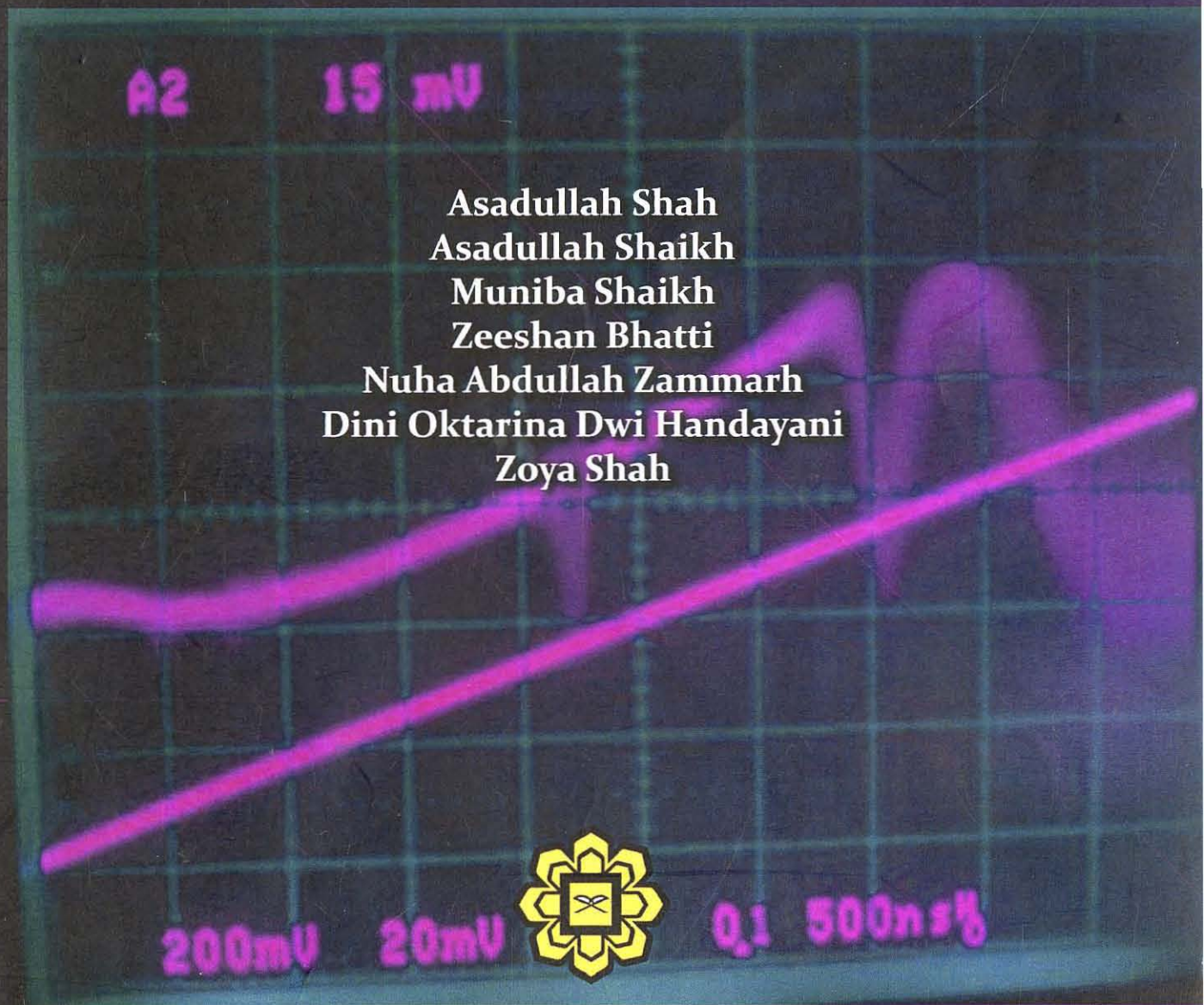
STATISTICAL TIME DIVISION MULTIPLEXING ARCHITECTURES AND DESIGN



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8. Multi-Pulse Residual Excitation Model (MP-PRE)

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8.0 Abstract

The Multi-Pulse Residual Excitation (MP-PRE) is a modified version of PRELP. The design of MP-PRE considers that after short term and long term correlations yet some correlation exist over the onset and sudden transitional regions where the energy of the signal is rising. This chapter explains the MP-PRE algorithms of encoding speech at low bit rates.

In original PRELP codebook design it is considered that the residual signal after STP and

LTP inverse filtering still contain some long term correlations. These correlations exist it onsets and sudden transitional regions' where the energy of the signal is suddenly rising and is not tracked by the LTP and STP filter to build up their memories as fast as required. Not only this but some secondary harmonic structure around the main pitch pulse is present too.

During synthesis, a similar structure is expected from the excitation signal, fixed codebooks fail to provide it: firstly, due to the fixed nature of the codebook vectors, they do not change in adaptive situations and secondly, the vector code words built up with random noise lack such harmonic structure.

In order to provide such harmonics and excitation pulses, the basic pulsed residual excitation MP-PRE is formed as follows. Firstly the set of primary excitation vectors are formed by placing a unit amplitude pulse at the start of the excitation buffer x and then after every Pj samples. Pj is varied from smallest possible pitch Dmin to N - 1 to get all the primary vectors. Therefore, for each Pj, the primary candidate excitation is derived as follows:

$$x_j(n) = \begin{cases} 1 & n = iP_j < N, \quad i = 0, 1, 2, \ldots \\ 0 & \text{otherwise} \end{cases}$$

Equation 8-1

Where N is sub frame length. All other primary vectors are derived as' given below,