Accuracy Improved Glottal Source Signal Separated from High-pitch Sound

Applying Weighed Linear Prediction (WLP) into Iterative Adaptive Inverse Filtering (IAIF)

LP(Linear Prediction)

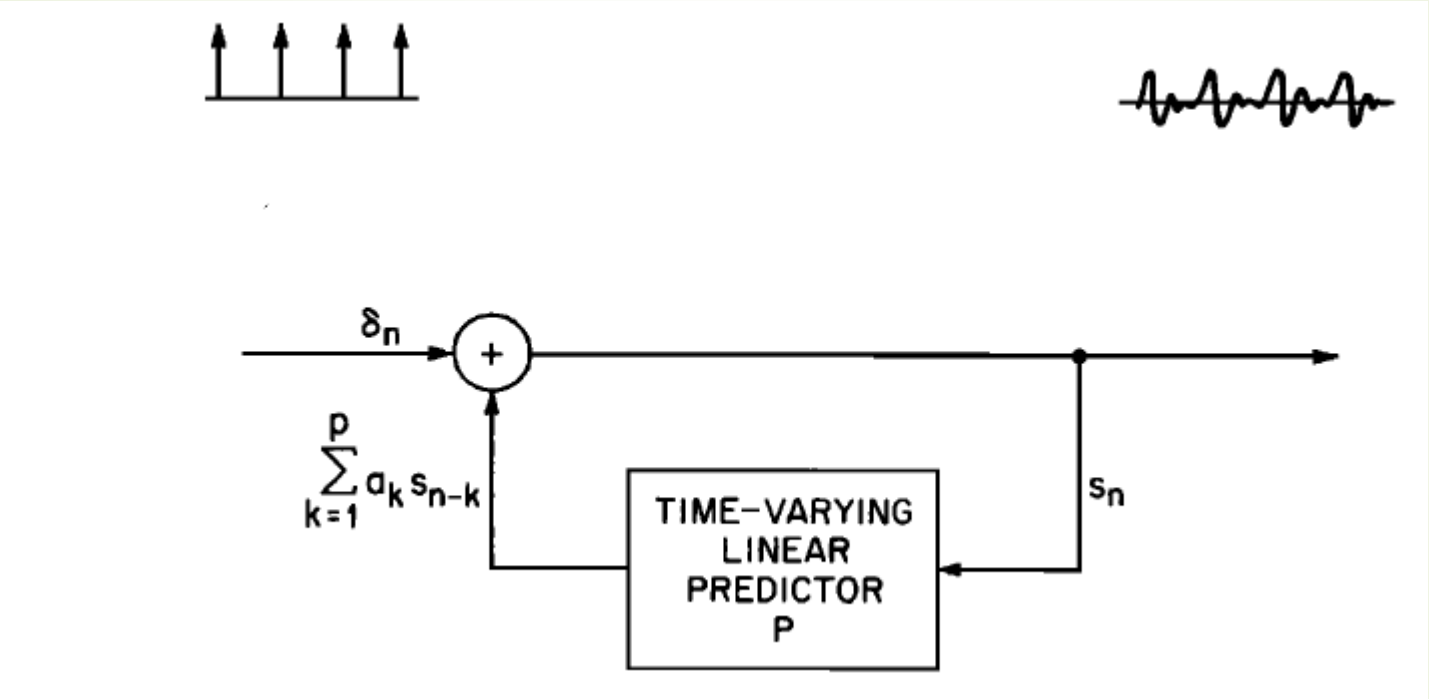


Fig. 1 Linear Prediction Model in Sound Generation Process

Accuracy Improvement Method WLP(Weighed Linear Prediction)

- Linear prediction fails to get accurate glottal flow in high pitch sound, so we use weight in conventional linear prediction when calculating residuals to change the effect of glottal flow at glottal closure instants (GCI).

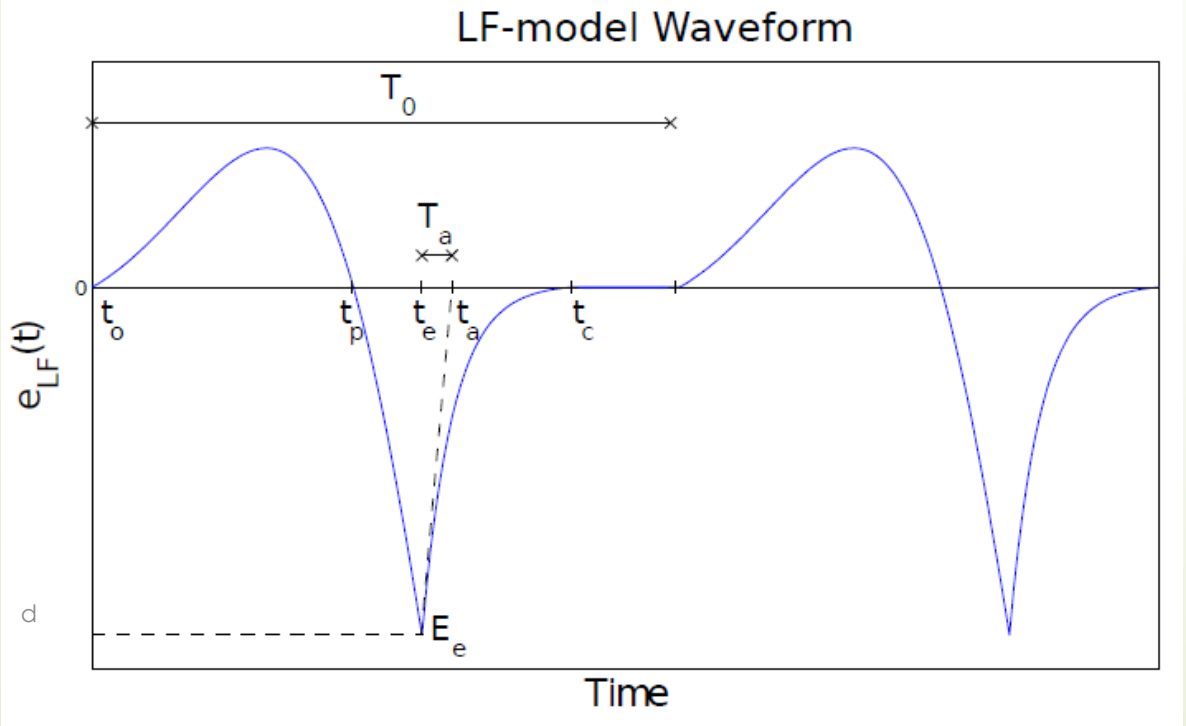


Fig.2 LF model waveform

$$E = \sum_{n=n_1}^{n_2} e_n^2 \cdot W_n = \sum_{n=n_1}^{n_2} \left(s_n - \sum_{k=1}^{p} a_k s_{n-k} \right)^2 \cdot W_n$$

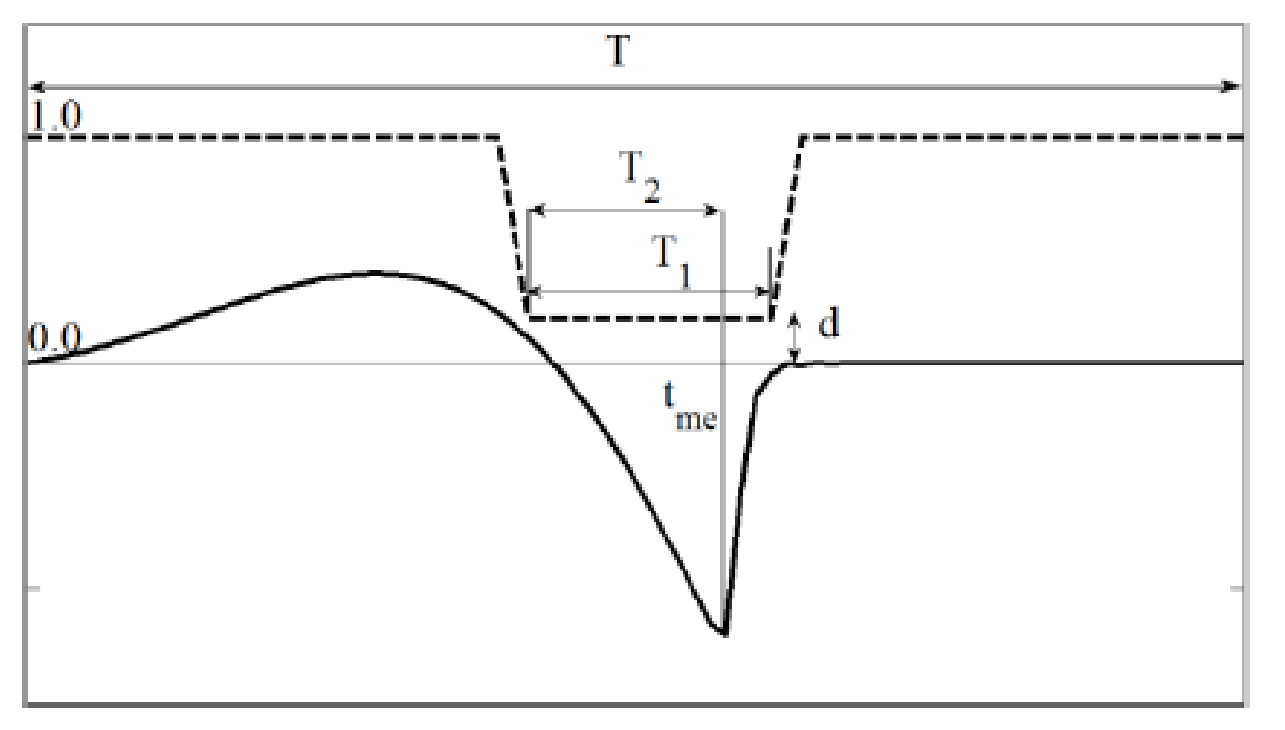


Fig.3 weight (dashed);
LF model waveform (solid)

IAIF(Iterative Adaptive Inverse Filtering)

Fig.4 Speech generation Model

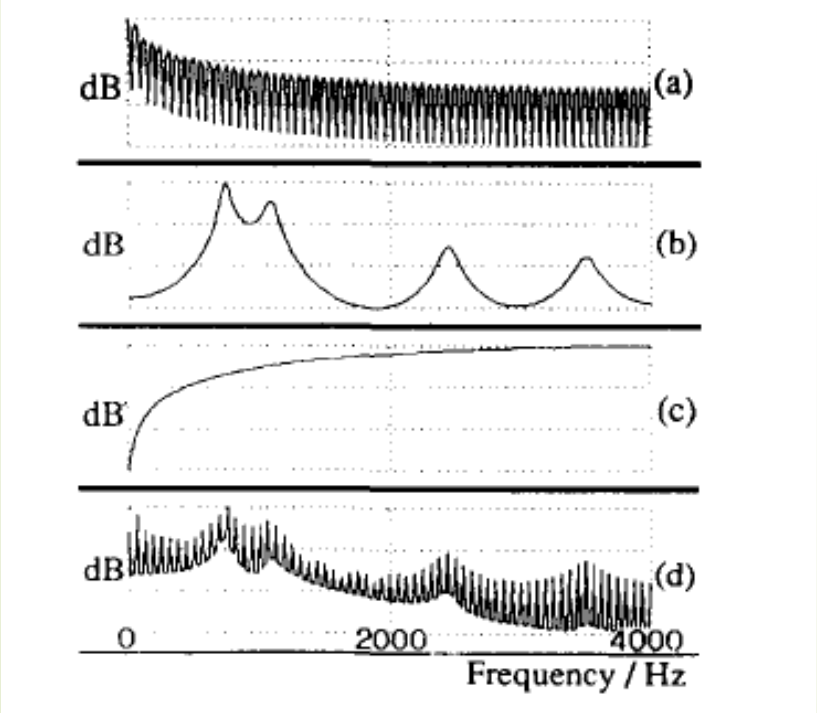
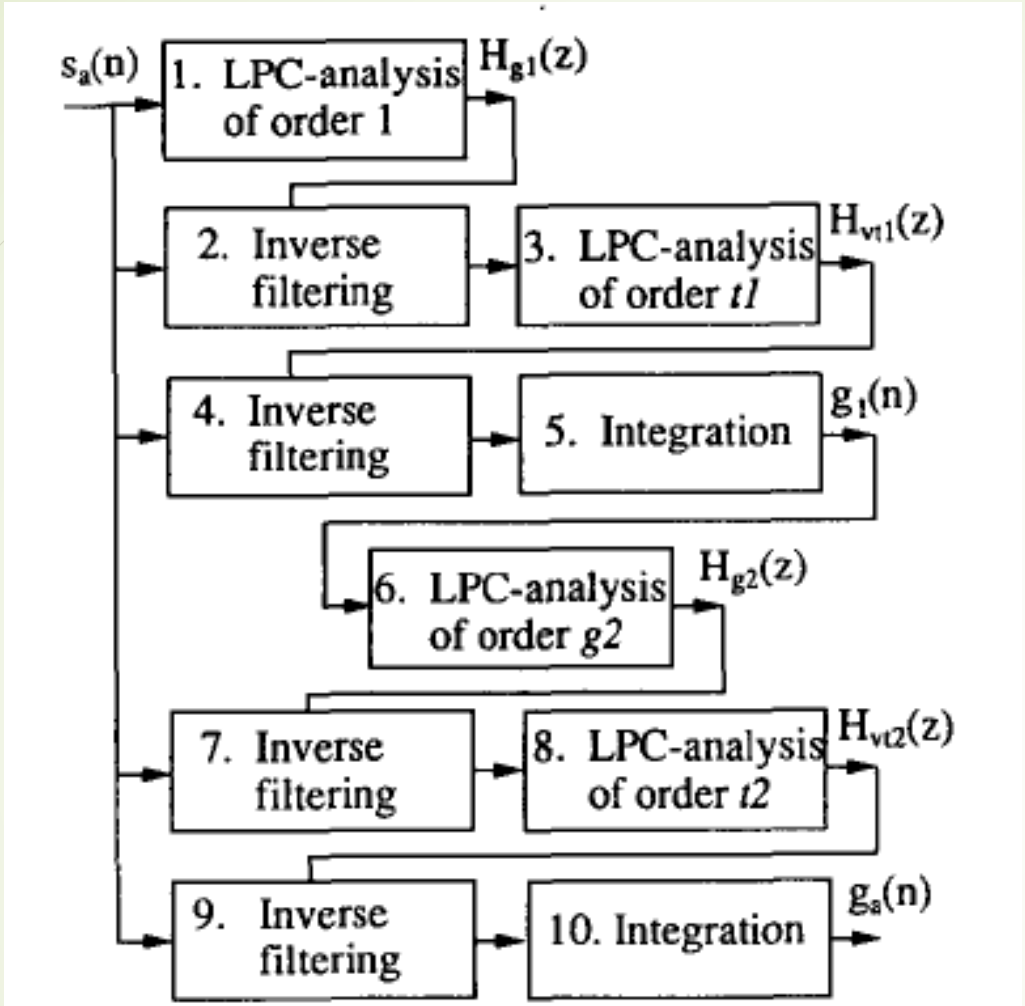


Fig.5 (a) Glottal excitation
(b) Vocal tract
(c) Lip radiation
(d) Speech



Where:

$$H_{g1}(z) = 1 + a z^{-1} \qquad H_{g2}(z) = 1 + \sum_{k=1}^{g2} c(k) z^{-k}$$

$$H_{vt1}(z) = 1 + \sum_{k=1}^{t1} b(k) z^{-k} \qquad H_{vt2}(z) = 1 + \sum_{k=1}^{t2} d(k) z^{-k}$$

Fig.6 IAIF flow chart