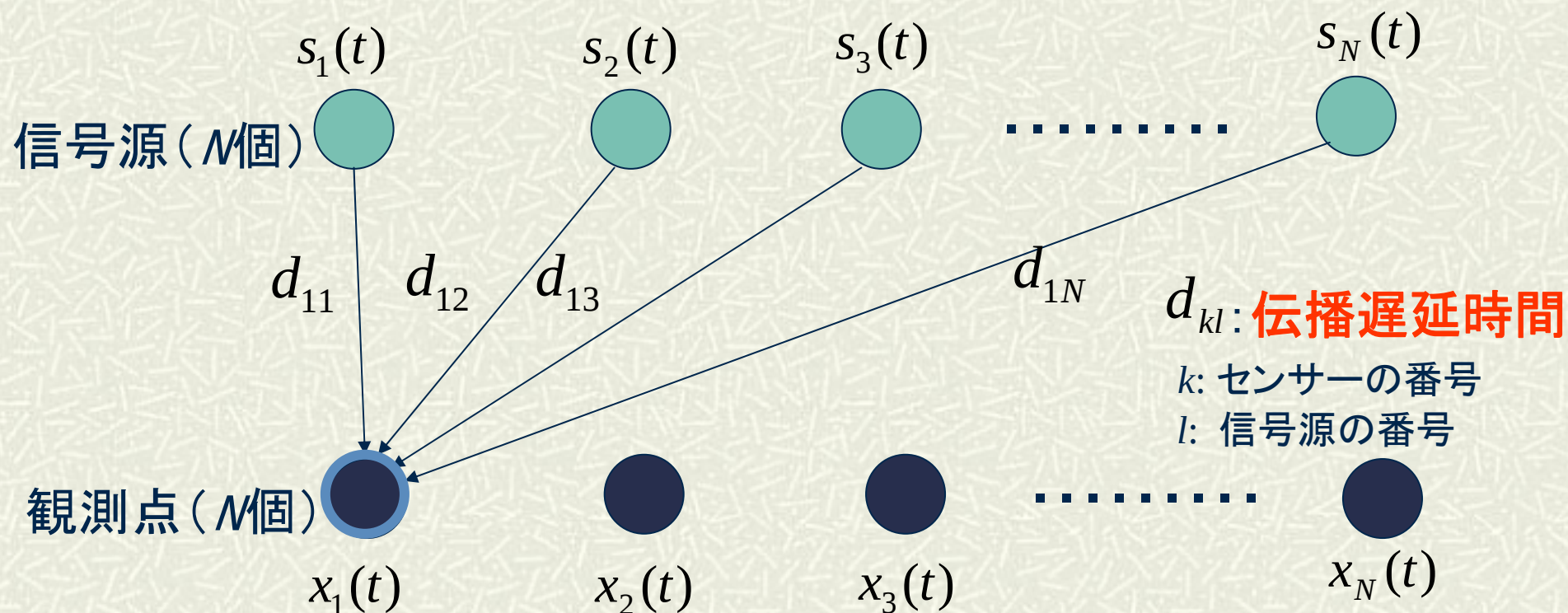


周波数領域ICA

■ 伝播遅延時間を含む混合

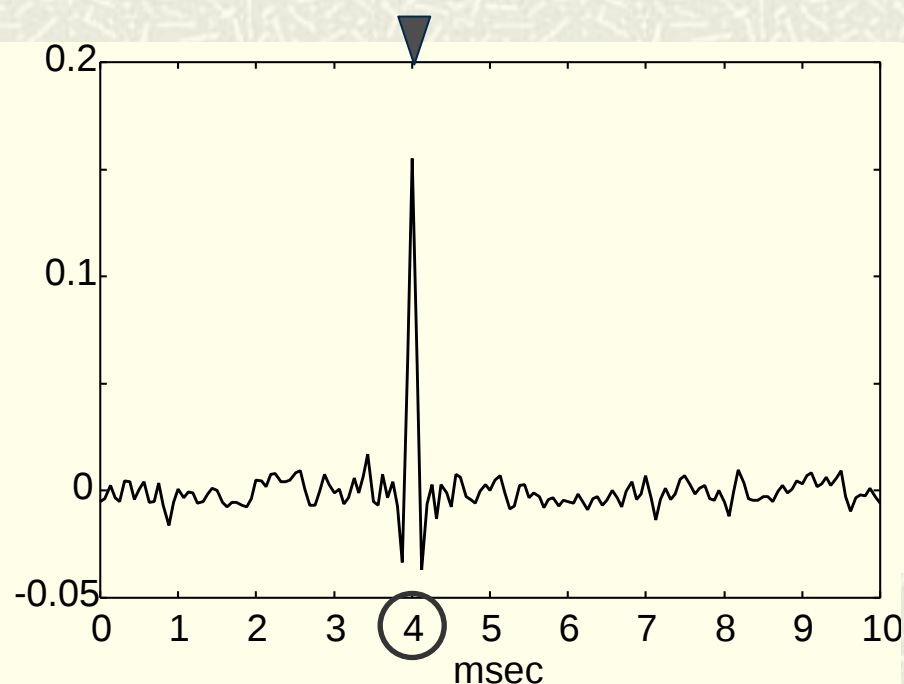


$$x_1(t) = a_{11}s_1(t-d_{11}) + a_{12}s_2(t-d_{12}) + \dots + a_{1N}s_N(t-d_{1N})$$

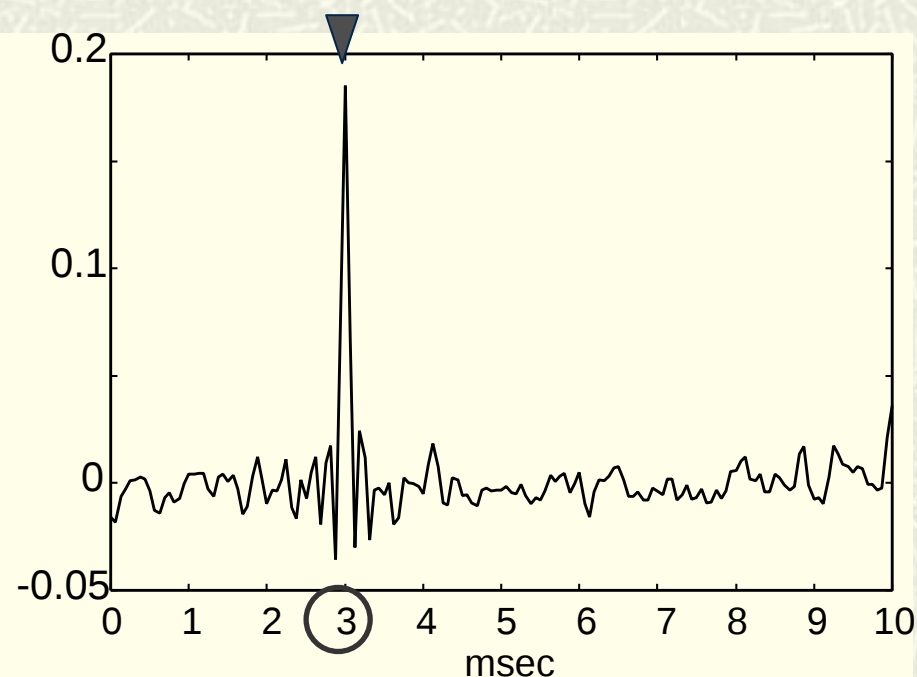
a_{kl} : 減衰定数

伝播遅延時間推定

- 推定混合行列の各要素の逆短時間フーリエ変換により
相対遅延時間を推定する

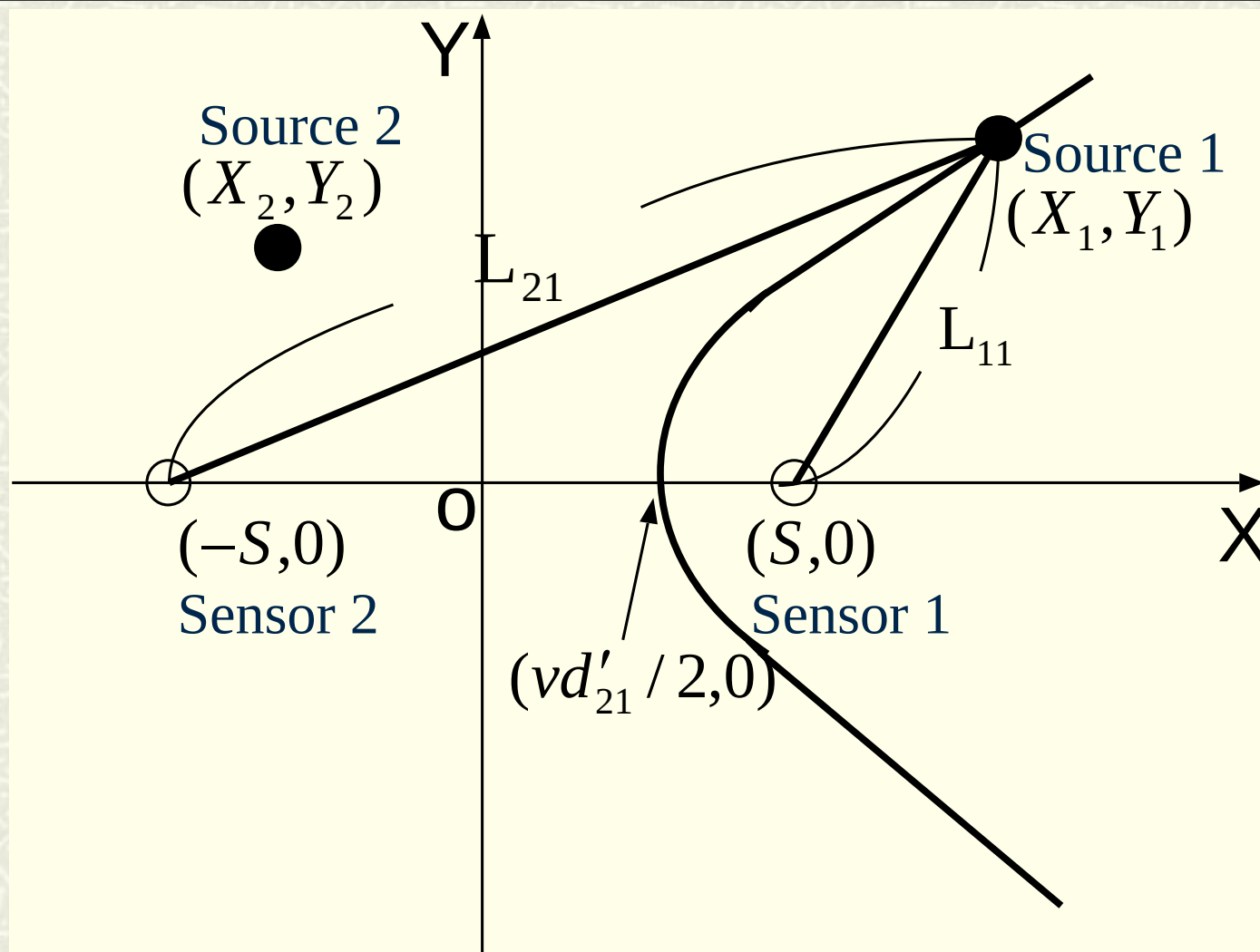


$$\text{Re}(\text{ISTFT}(W_{12}^{-1}(f_n)))$$



$$\text{Re}(\text{ISTFT}(W_{21}^{-1}(f_n)))$$

音源定位(1)



$$L_{21} - L_{11} = vd'_{21}$$

v : 原信号の速度

音源定位(2)

$$L_{21} - L_{11} = vd'_{21} \longrightarrow \frac{X_1^2}{(vd'_{21}/2)^2} - \frac{Y_1^2}{R^2} = 1$$

$$(R^2 = S^2 - (vd'_{21}/2)^2)$$

この連立方程式から、
音源位置が求まる

$$a_{kl} \propto \frac{1}{L_{kl}} \longrightarrow \frac{L_{11}}{L_{21}} = \frac{\sqrt{(X_1 - S)^2 + Y_1^2}}{\sqrt{(X_1 + S)^2 + Y_1^2}} = a'_{21}$$

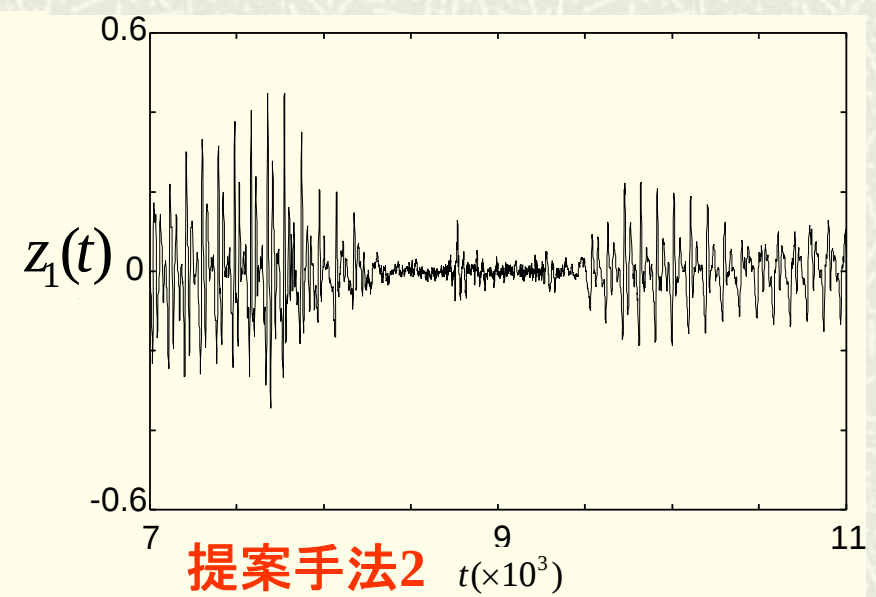
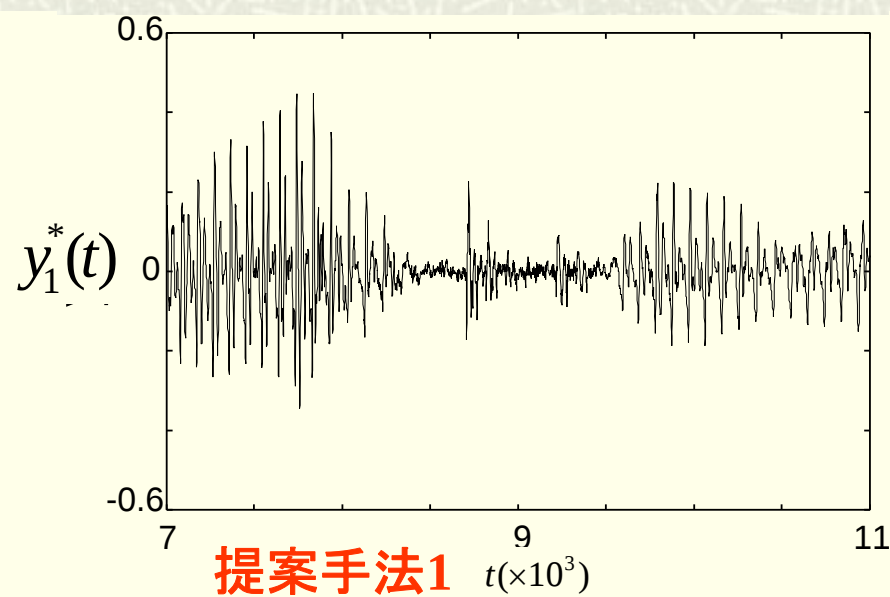
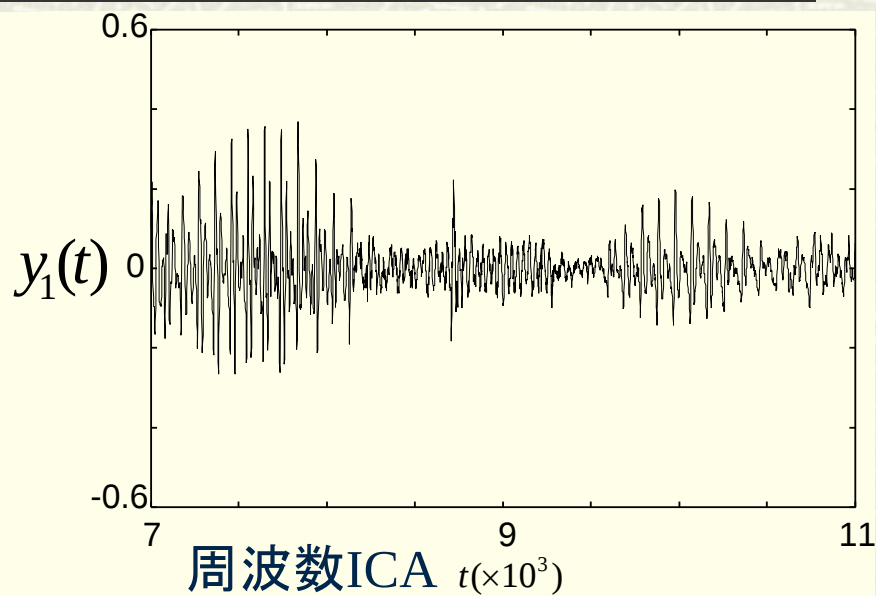
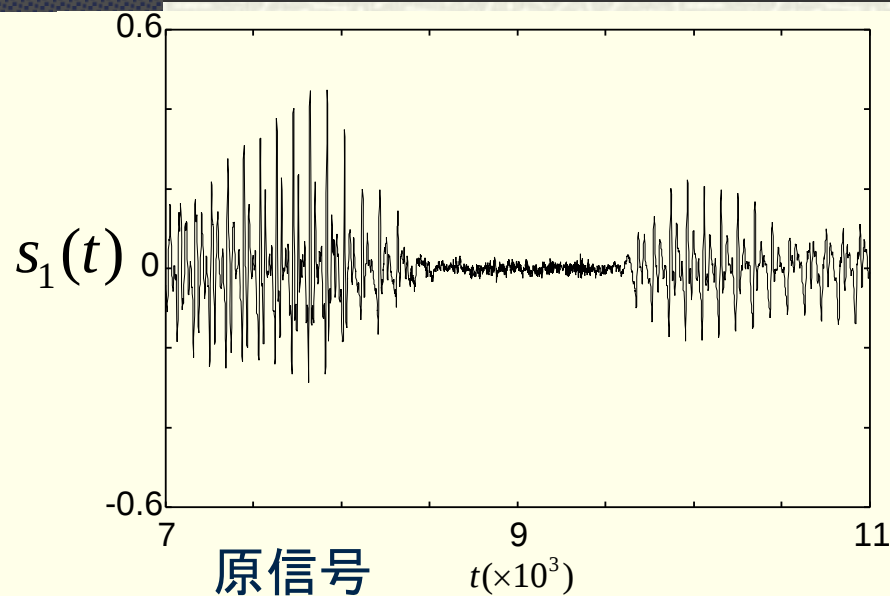


$$X_1 = \frac{1}{4} \frac{(1 + a'_{21})}{(1 - a'_{21})} \frac{(vd'_{21})^2}{S}, \quad Y_1 = \frac{2R}{vd'_{21}} \sqrt{X_1^2 - \left(\frac{vd'_{21}}{2}\right)^2}$$

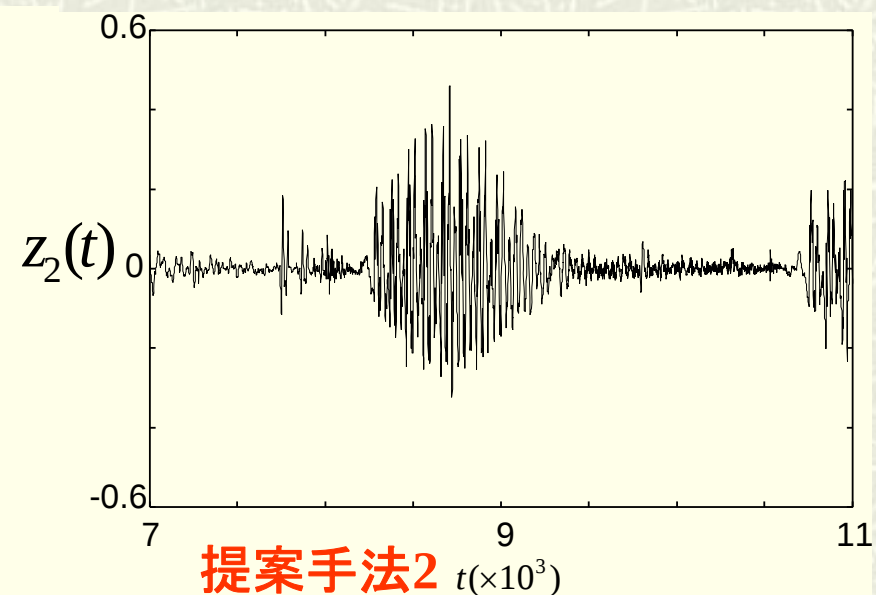
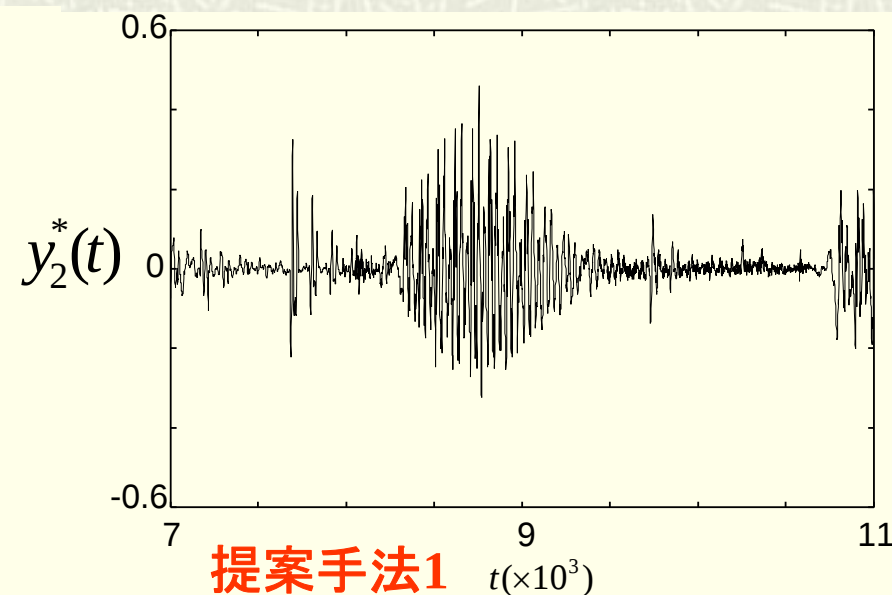
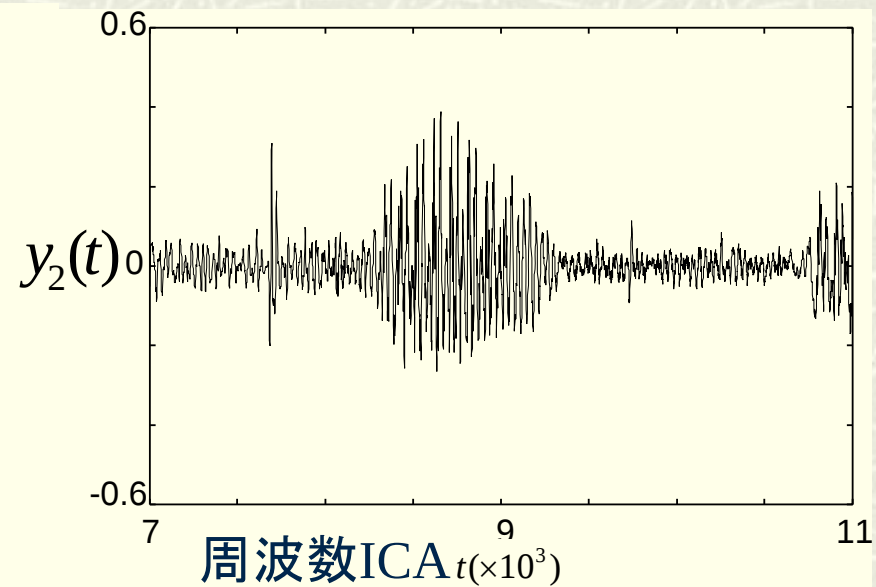
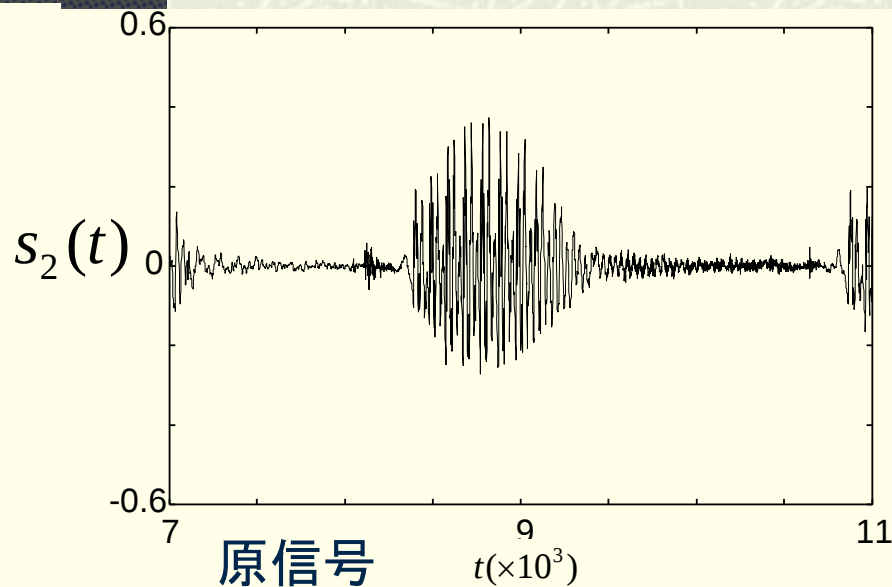
同様に

$$X_2 = \frac{1}{4} \frac{(1 + a'_{12})}{(1 - a'_{12})} \frac{(vd'_{12})^2}{S}, \quad Y_2 = \frac{2R}{vd'_{12}} \sqrt{X_2^2 - \left(\frac{vd'_{12}}{2}\right)^2}$$

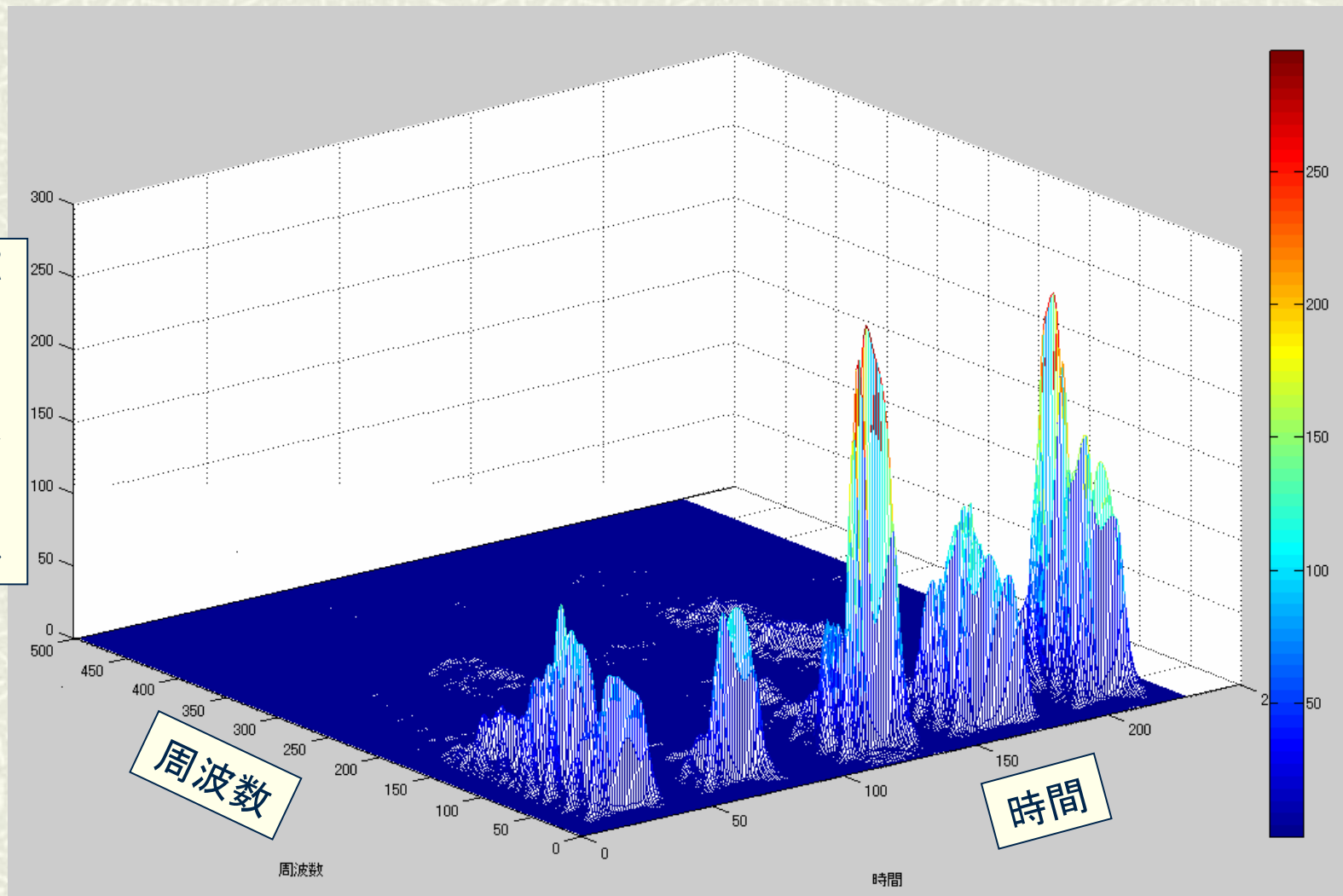
信号分離結果(1)



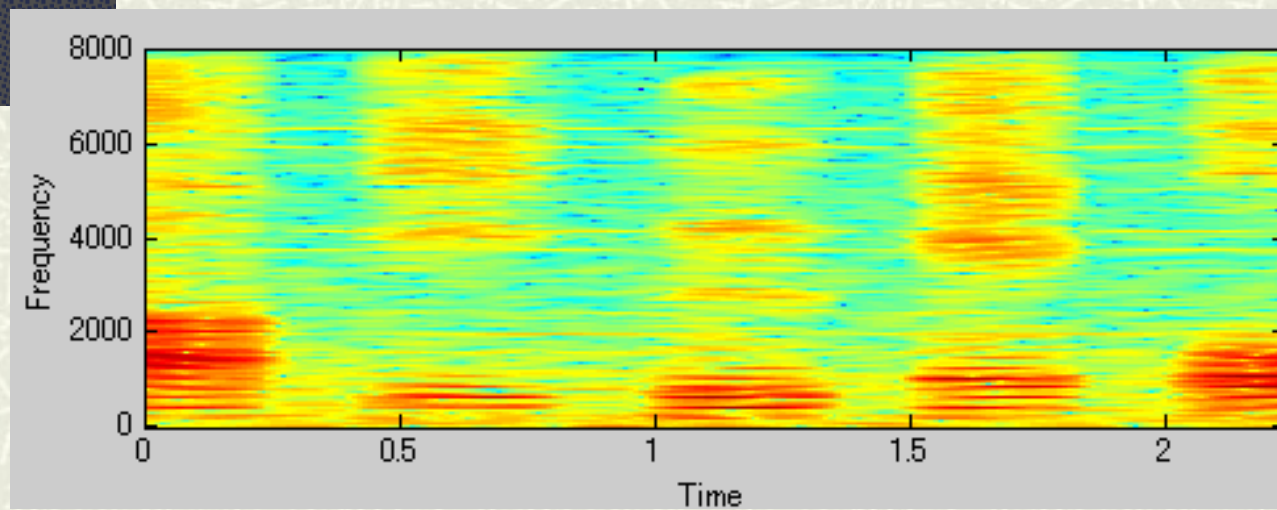
信号分离结果(2)



パワースペクトル



男性「あいうえお」



女性「あいうえお」

