

Linear Prediction Examples  
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LP equation

$$\sum_{i=0}^n a_i s[n-i] = e[n]$$

where

$s[n]$  : Input speech samples

$e[n]$ : Prediction error

$a_0 = 1$

Frame No

23

MSE

1.0e+008 \*

[4.3184 1.1113 0.6974 0.6958 0.5091 0.4801 0.4155 0.3038 0.2818  
0.2818 0.2817]

Autocorrelation

[1.0000 0.8618 0.5856 0.2790 -0.0642 -0.4065 -0.6843 -0.7770 -0.7016  
-0.5629 -0.3365]

Reflection coeffs

0.8618 -0.6103 -0.0480 -0.5180 -0.2387 -0.3669 0.5184 -0.2690 -0.0139  
0.0174

LP coefficients

1.0000 -0.8618

1.0000 -1.3877 0.6103

1.0000 -1.3584 0.5437 0.0480

1.0000 -1.3336 0.8254 -0.6557 0.5180

1.0000 -1.2099 0.6688 -0.4587 0.1997 0.2387

1.0000 -1.1223 0.7421 -0.6270 0.4451 -0.2052 0.3669

1.0000 -1.3125 0.8485 -0.8578 0.7701 -0.5899 0.9487 -0.5184

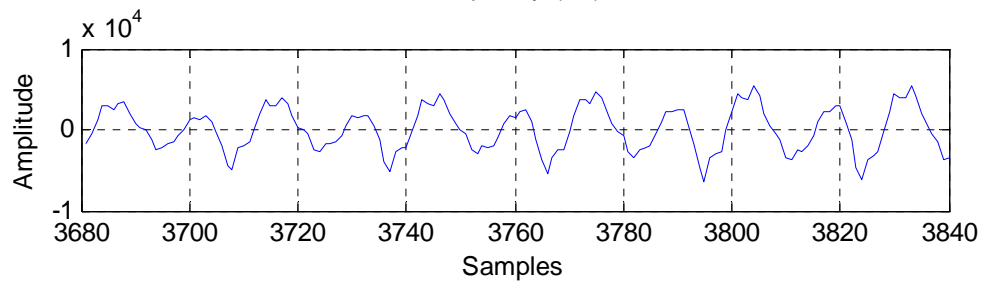
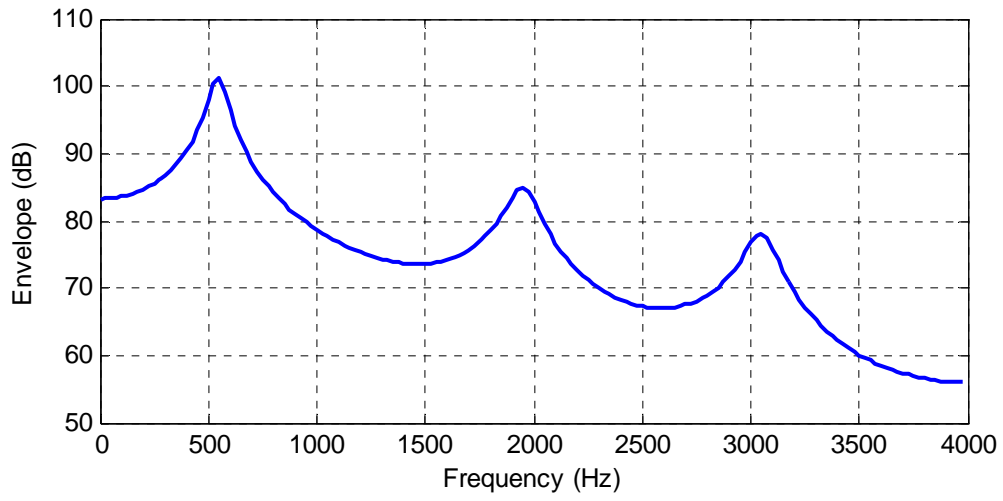
1.0000 -1.4520 1.1037 -1.0165 0.9773 -0.8207 1.1770 -0.8715 0.2690

1.0000 -1.4482 1.0916 -1.0001 0.9659 -0.8071 1.1629 -0.8561 0.2489

0.0139

1.0000 -1.4485 1.0873 -0.9852 0.9457 -0.7931 1.1461 -0.8388 0.2299

0.0390 -0.0174



Frame No

45

MSE

1.0e+009 \*

[2.5460 0.7921 0.1698 0.1495 0.0981 0.0955 0.0870 0.0784 0.0783  
0.0664 0.0640]

Autocorrelation

[1.0000 0.8300 0.4131 -0.0658 -0.4605 -0.7030 -0.7765 -0.6667 -0.3715  
0.0308 0.3980]

Reflection coeffs

0.8300 -0.8863 0.3457 -0.5864 -0.1630 -0.2974 0.3160 -0.0333 -0.3893  
0.1906

LP coefficients

1.0000 -0.8300

1.0000 -1.5656 0.8863

1.0000 -1.8721 1.4276 -0.3457

1.0000 -2.0748 2.2649 -1.4436 0.5864

1.0000 -1.9792 2.0295 -1.0743 0.2481 0.1630

1.0000 -1.9307 2.1033 -1.3938 0.8518 -0.4257 0.2974

1.0000 -2.0247 2.2378 -1.6630 1.2922 -1.0902 0.9075 -0.3160

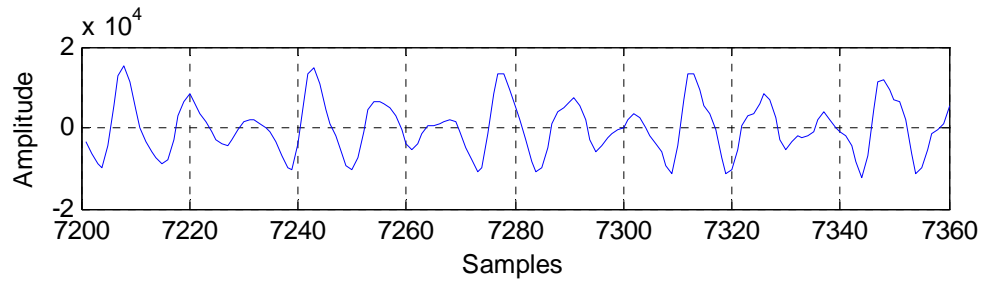
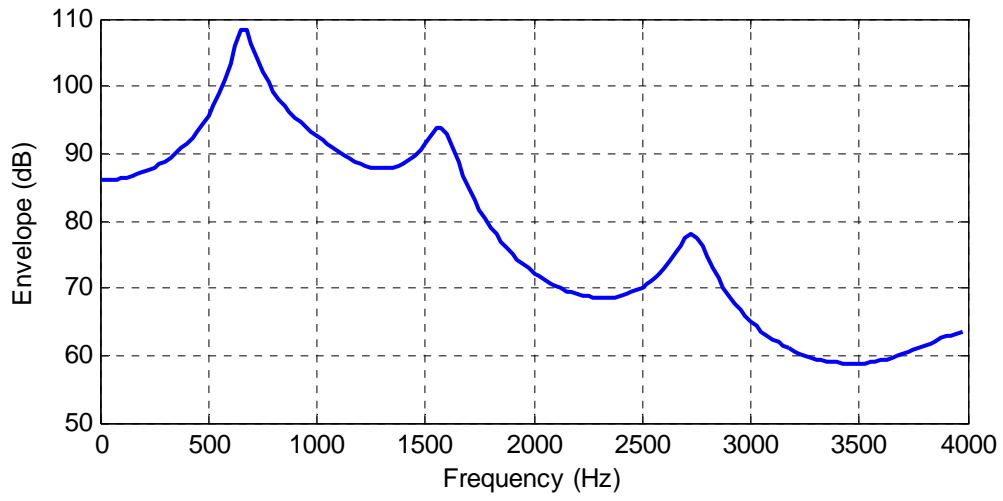
1.0000 -2.0352 2.2680 -1.6993 1.3353 -1.1457 0.9821 -0.3835 0.0333

1.0000 -2.0223 2.1188 -1.3171 0.8893 -0.6259 0.3206 0.4994 -0.7589

0.3893

1.0000 -2.0965 2.2635 -1.4123 0.8282 -0.5066 0.1511 0.7505 -1.1628

0.7748 -0.1906



Frame No

87

MSE

1.0e+008 \*  
[5.8264 3.7664 3.6564 3.3063 2.6078 2.1135 2.0144 2.0100 1.9122  
1.8832 1.8425]

Autocorrelation

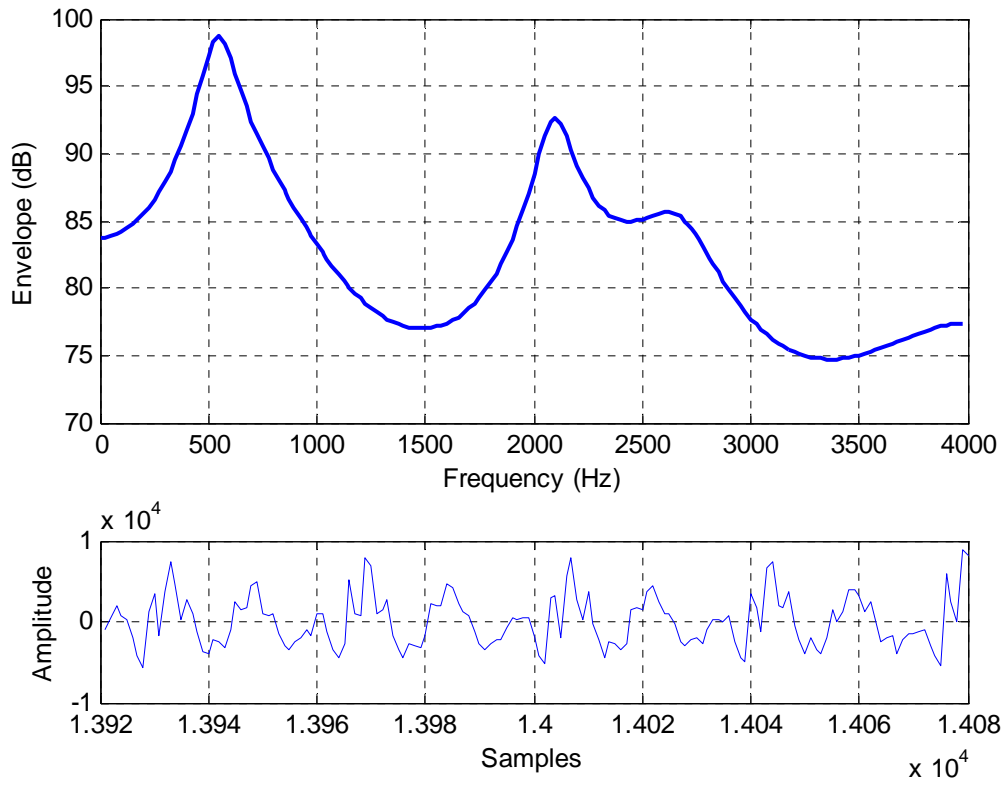
[1.0000 0.5946 0.2431 0.2618 0.0254 -0.4342 -0.5552 -0.4398 -0.3788  
-0.3752 -0.2122]

Reflection coeffs

0.5946 -0.1709 0.3094 -0.4596 -0.4353 -0.2166 -0.0469 0.2205 -0.1233  
-0.1470

LP coefficients

1.0000 -0.5946  
1.0000 -0.6962 0.1709  
1.0000 -0.7491 0.3863 -0.3094  
1.0000 -0.8913 0.5639 -0.6538 0.4596  
1.0000 -0.6912 0.2793 -0.4083 0.0716 0.4353  
1.0000 -0.5970 0.2948 -0.4967 0.1321 0.2856 0.2166  
1.0000 -0.5868 0.3082 -0.4905 0.1088 0.2994 0.1886 0.0469  
1.0000 -0.5971 0.2666 -0.5565 0.0848 0.4076 0.1206 0.1763 -0.2205  
1.0000 -0.6243 0.2884 -0.5417 0.1351 0.4181 0.0520 0.2092 -0.2941  
0.1233  
1.0000 -0.6062 0.2451 -0.5109 0.1427 0.4795 0.0719 0.1296 -0.2517  
0.0315 0.1470



Frame No  
3237

MSE

1.0e+009 \*  
[1.3549 0.5456 0.4448 0.3984 0.3350 0.3244 0.2877 0.2876 0.1696  
0.1648 0.1648]

Autocorrelation

[1.0000 0.7728 0.4242 0.2425 0.1002 -0.0461 -0.1608 -0.2799 -0.4802  
-0.6799 -0.6334]

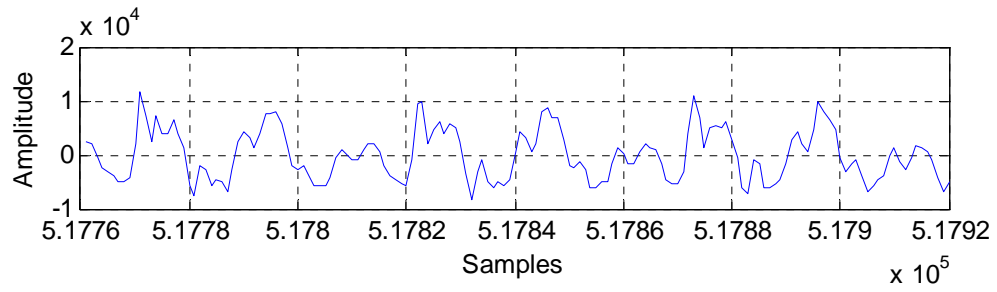
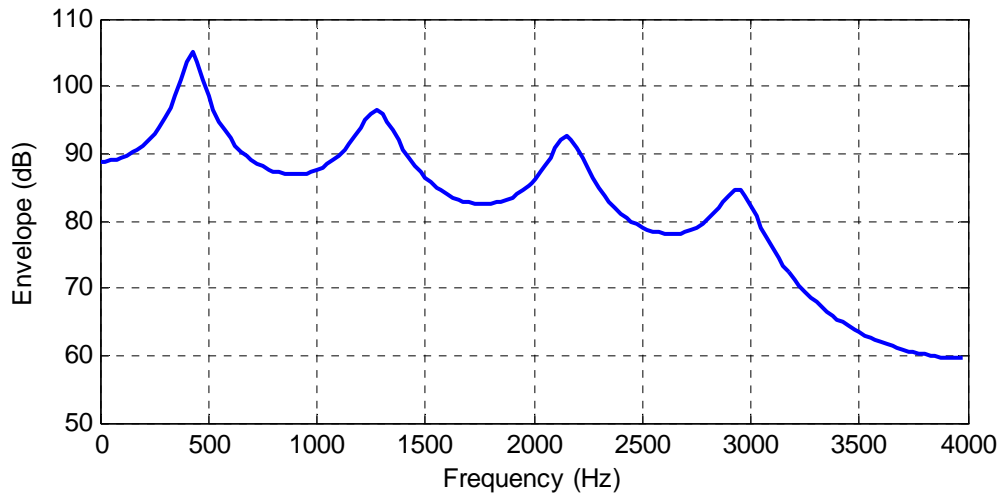
Reflection coeffs

0.7728 -0.4299 0.3230 -0.3988 0.1783 -0.3360 -0.0256 -0.6403 0.1687  
0.0165

LP coefficients

1.0000 -0.7728  
1.0000 -1.1051 0.4299  
1.0000 -1.2440 0.7869 -0.3230  
1.0000 -1.3728 1.1007 -0.8191 0.3988  
1.0000 -1.4439 1.2468 -1.0154 0.6436 -0.1783  
1.0000 -1.5038 1.4630 -1.3565 1.0625 -0.6634 0.3360  
1.0000 -1.4952 1.4460 -1.3293 1.0278 -0.6260 0.2975 0.0256  
1.0000 -1.4788 1.6365 -1.7302 1.6859 -1.4772 1.2234 -0.9318 0.6403  
1.0000 -1.5869 1.7937 -1.9366 1.9351 -1.7616 1.5153 -1.2079 0.8898  
-0.1687  
1.0000 -1.5841 1.7790 -1.9166 1.9100 -1.7325 1.4833 -1.1759 0.8602  
-0.1425 -0.0165





Frame No  
3314

MSE

1.0e+009 \*  
[1.4844 1.0290 0.7300 0.7099 0.5276 0.5157 0.3131 0.3066 0.2654  
0.2497 0.2495]

Autocorrelation

[1.0000 0.5539 -0.0669 -0.2740 -0.3630 -0.3617 -0.3000 -0.3342 -0.2109  
0.2082 0.5726]

Reflection coeffs

0.5539 -0.5390 0.1659 -0.5067 0.1506 -0.6268 -0.1441 -0.3663 0.2432  
-0.0287

LP coefficients

1.0000 -0.5539  
1.0000 -0.8525 0.5390  
1.0000 -0.9419 0.6805 -0.1659  
1.0000 -1.0260 1.0253 -0.6432 0.5067  
1.0000 -1.1023 1.1222 -0.7976 0.6612 -0.1506  
1.0000 -1.1967 1.5366 -1.2976 1.3646 -0.8415 0.6268  
1.0000 -1.1064 1.4154 -1.1010 1.1777 -0.6202 0.4544 0.1441  
1.0000 -1.0536 1.5819 -1.3282 1.6091 -1.0235 0.9729 -0.2612 0.3663  
1.0000 -1.1427 1.6454 -1.5647 1.8580 -1.4147 1.2959 -0.6459 0.6225  
-0.2432  
1.0000 -1.1497 1.6633 -1.5833 1.8952 -1.4554 1.3493 -0.6908 0.6698  
-0.2760 0.0287

