References

Claerbout, J. F. (1976), Fundamentals of geophysical data processing: McGraw Hill Book Co.

James and James (1968), Mathematics dictionary (third ed.): D. Van Nostrand Co.

Appendix A

We prove here that a time series with impulsive spectrum is perfectly predictable with a one-step-ahead prediction filter. That is, there is prediction error filter (PEF) $a(t)$, such that when convolved with the time series the result is identically zero. The z-transform of the PEF is:

$$A(z) = 1 + a_1 z + a_2 z^2 + \ldots, + a_N z^N.$$

Because the spectrum is impulsive, the zeroes of $A(z)$ are located in the unit circle. The nth coefficient is related to the product of all zeroes (see James and James, 1968) so that $|a_N| = 1$. The last term of the PEF is the last reflection coefficient and because it is of unit magnitude the prediction error is identically zero (Claerbout, 1976).