Definition of Time Gain Power

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Reflection seismic data is gained according to the formula

$$d'(t\,,\,x) \;=\; t^{\gamma}\, d(t\,,\,x) \tag{1}$$

The gain control parameter γ (sometimes known as *tpow*) will be chosen to be that value for which the median of $|\,d'\,|$ in the first two seconds matches the median in the interval 2-4sec.

Guess an initial value of γ, compute the two required medians, and denote them by M_{02} and M_{24}. The correction $\Delta\gamma$ will be deduced from

$$M_{02}\, 1^{\Delta\gamma} \;=\; M_{24}\, 3^{\Delta\gamma} \tag{2}$$

Solving we get

$$\Delta\gamma \;=\; \frac{\ln\,(M_{02}/M_{24})}{\ln\,3} \tag{3}$$

The algorithm is:

$\gamma \;=\; 2$
repeat {
$M_{02} \;=\; \underset{\text{all } x\,,\ 0\text{–}2 \text{ sec}}{Median}\; t^{\gamma}\;|\,d(t\,,\,x)\,|$
$M_{24} \;=\; \underset{\text{all } x\,,\ 2\text{–}4 \text{ sec}}{Median}\; t^{\gamma}\;|\,d(t\,,\,x)\,|$
$\Delta\gamma \;=\; [\ln(M_{02}/M_{24})]\;/\;\ln\,3$
$\gamma \;=\; \gamma + \Delta\gamma$
} until ($|\,\Delta\gamma\,| \;<\; \epsilon$)

A test of the method found convergence attained at the following rate:

ϵ	iterations
0.01	2
0.001	4
0.00001	6