relation, $Q_y y$ depends on the particular constraints. When $Q_y y = 0$, the solution is $\gamma = Q_x x = \gamma_{min}$, which has a minimum energy.

$$\Gamma = \min_{\gamma:\, H\gamma=\mu} \left\| \frac{\gamma(i)}{\|\gamma(i)\|} - h(i) \right\|^2 = \min_{\gamma:\, H\gamma=\mu} = 2\left(1 - \frac{Re(\gamma^T h)}{\|\gamma\|}\right) \quad (A.9)$$

Minimizing Γ w.r.t γ is equivalent to

$$\max_{\gamma:H\gamma=\mu} \xi = \max_{\gamma:H\gamma=\mu} \frac{Re(\gamma^T h)}{\|\gamma\|} \quad (A.10)$$

Because of the relationship

$$\gamma^T h = x^T Q_x^T h + y^T Q_y^T h = (Q_x x)^T h \quad (A.11)$$

and (A.8), Eq. (A.10) can be written as

$$\max_{y \in R^{L-p}} \xi = \max_{y:H\gamma=\mu} \frac{Re(x^T Q_x^T h)}{\sqrt{\|x\|^2 + \|y\|^2}}, \quad (A.12)$$

Obviously, the maximum of ξ occurs when $\|y\|$ is a zero vector. Substituting $y=0$ in Eq. (A.6) yields

$$\gamma = Q_x x = Q_x (R^T)^{-1} \mu. \quad (A.13)$$

The corresponding least-square error is

$$\Gamma = 2\left(1 - \frac{Re(\mu^T R^{-1} Q_x^T h)}{\|(R^T)^{-1}\mu\|}\right) \quad (A.14)$$

Eq. (A:13) is the solution to compute the optimal γ that is most similar to h. The solution requires $\|y\|=0$, and Eq. (A.8) indicates that γ contains the minimum energy. Thus γ satisfies the minimum energy condition

$$\gamma = H^T (HH^T)^{-1} \mu. \quad (A.15)$$

Indeed, one can easily prove that when $H^T = Q.R$ as given in (A.1), the minimum energy solution (A.15) is identical to the optimal solution (A.13).

What is claimed is:

1. A signal analyzer, comprising:

a source of a sequence of digital signals representative of an input signal; and

a processor coupled to the source for computing orthogonal-like discrete Gabor transform coefficients $C_{m,n}$ in response to the sequence, wherein the processor uses the coefficients to compute a time-varying spectrum of input signal energy;

wherein said spectrum is used in analyzing said input signal.

2. The signal analyzer of claim 1, wherein the first processor comprises a first means for generating the coefficients and a second means for computing the spectrum.

3. The signal analyzer of claim 2, wherein the second means includes storage means for storing a table of factors used in computation of the spectrum.

4. The signal analyzer of claim 1, wherein the processor computes a cross-term deleted Wigner-Ville distribution.

5. The signal analyzer of claim 1, wherein the processor includes a computation engine for computing an orthogonal-like discrete Gabor transform resulting in