

2 – The method as claimed in claim 1, characterized in that the noise matrix is estimated by likening it to the inverse of the correlation matrix of the signals received $\hat{R}_{xx}(l)$ and the criterion of joint computation of the index and of the synchronization offset is produced by the following formula: by
 5 determining the trace of a matrix resulting from the product formed by the inverse correlation matrix of the learning sequences, the conjugate transpose of the estimate of the intercorrelation matrix of the signals received and of the matrix of the learning sequences, the inverse of an estimate of the noise matrix $\hat{R}^{-1}(l) = \hat{R}_{xx}^{-1}(l)$ and the estimate of the intercorrelation matrix between
 10 the observations received and the learning sequences:

$$C(l, \Delta f) = E0_GLRT3(l, \Delta f) = \text{Tr}[R_{ss}^{-1} R_{xs}(l, \Delta f)^H R_{xx}^{-1}(l) R_{xs}(l, \Delta f)].$$

3 – The method as claimed in claim 2, characterized in that, in the case where the M reference sequences transmitted by the M transmitting sensors
 15 are orthogonal, the computation of the synchronization index is performed by using the following formula:

$$C(l, \Delta f) = E0_GLRT3(l, \Delta f) \triangleq \sum_{i=1}^M \frac{\hat{r}_{xs_i}(l, \Delta f)^H \hat{R}_x(l)^{-1} \hat{r}_{xs_i}(l, \Delta f)}{r_{si}}$$

where the vector $\hat{r}_{xs_i}(l, \Delta f)$ is the intercorrelation vector between the observations offset by $-\Delta f$ and the learning sequence transmitted by a
 20 transmitter i for a tested synchronization position l, defined by:

$$\frac{1}{K} \sum_{n=0}^{K-1} x((k+l)) s_i(k)^* \exp(-j2\pi\Delta f k T_e)$$

where $s_i(k)$ is the component i of $\mathbf{s}(k)$ and T_e is the sampling period.

4 – The method as claimed in claim 1, characterized in that the estimated
 25 noise matrix, $\hat{R}_1(l, \Delta f)$, is estimated by subtracting the contributions of the synchronization sequences in the estimate of the correlation matrix of the

signals received, assuming that the signal containing the reference sequences is aligned in time and in frequency with the observation matrix and the criterion is obtained by the following formula:

$$\hat{R}_1(l, \Delta f) = \hat{R}_{xx}(l) - \hat{R}_{xs}(l, \Delta f) R_{ss}^{-1} \hat{R}_{xs}(l, \Delta f)^H$$

$$C(l, \Delta f) = E1_GLRT3(l, \Delta f) = \text{Tr}[R_{ss}^{-1} \hat{R}_{xs}(l, \Delta f)^H \hat{R}_1^{-1}(l, \Delta f) \hat{R}_{xs}(l, \Delta f)]$$

R_{ss}^{-1} the inverse of the correlation matrix of the reference sequences,

$\hat{R}_{xs}(l, \Delta f)$ the estimate of the intercorrelation matrix and its transpose $\hat{R}_{xs}(l, \Delta f)^H$, and

$\hat{R}_{xx}(l)$ the estimate of the correlation matrix of the signals received.

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5 – The method as claimed in claim 4, characterized in that, when the M reference sequences are orthogonal sequences, the criterion is obtained by the following formula:

$$C(l, \Delta f) = E1_GLRT3(l, \Delta f) \triangleq \sum_{i=1}^M \frac{\hat{r}_{xs_i}(l, \Delta f)^H \hat{R}_1^{-1}(l, \Delta f) \hat{r}_{xs_i}(l, \Delta f)}{r_{si}}$$

15 where the vector $\hat{r}_{xs_i}(l, \Delta f)$ is the intercorrelation vector between the observations offset by $-\Delta f$ and the learning sequence transmitted by a transmitter i for a tested synchronization position l, defined by:

$$\hat{r}_{xs_i}(l, \Delta f) \triangleq \frac{1}{K} \sum_{n=0}^{K-1} x((k+l)) s_i(k)^* \exp(-j2\pi\Delta f k T_e)$$

20 where $s_i(k)$ is the component i of $\mathbf{s}(k)$, $\hat{R}_1^{-1}(l, \Delta f)$ is the inverse of the estimate of the noise matrix, and T_e is the sampling period.

6 – The method as claimed in one of the preceding claims, characterized in that an observation matrix ($N \times K'$) is constructed with K' chosen and set in order for the channel matrix H and the noise matrix to be stationary on the temporal horizon set by K' and the estimated matrix

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