Prediction:

$$p(t) = \sum_i A_i \cos(2\pi f_i t - \phi_i)$$

- A_i: Unknown amplitude
- f_i: Known frequency
- ϕ_i: Unknown phase

Transformation:

$$p(t) = \sum_i A_i \cos\phi_i \cos(2\pi f_i t) + A_i \sin\phi_i \sin(2\pi f_i t)$$

$A_i \cos\phi_i$ → $\boldsymbol{C_i}$; $A_i \sin\phi_i$ → $\boldsymbol{S_i}$

Observation: $o_1, o_2, \ldots, o_M$ at time t = 1, 2, …, M

Linear regression model:

$\cos(2\pi f_1 * 1)$	$\sin(2\pi f_1 * 1)$	…	$\cos(2\pi f_N * 1)$	$\cos(2\pi f_N * 1)$
$\cos(2\pi f_1 * 2)$	$\sin(2\pi f_1 * 2)$	…	$\cos(2\pi f_N * 2)$	$\cos(2\pi f_N * 2)$
⋮	⋮	…	⋮	⋮
$\cos(2\pi f_1 * M)$	$\sin(2\pi f_1 * M)$	…	$\cos(2\pi f_N * M)$	$\cos(2\pi f_N * M)$

$$\times \begin{bmatrix} C_1 \\ S_1 \\ \vdots \\ C_N \\ S_N \end{bmatrix} = \begin{bmatrix} o_1 \\ o_2 \\ \vdots \\ o_M \end{bmatrix}$$