Suppose that we observe a stationary process of the form

\[ y(n) = \sum_{i=1}^{p} \alpha_i e^{j(2\pi f_i n + \phi_i)} + u(n), \]

where \( \{\alpha_i, f_i\} \) are unknown deterministic parameters, \( \{\phi_i\} \) are iid random variables uniformly distributed on \([0, 2\pi]\), and \( \{u(n)\} \) is a stationary Gaussian process generated by

\[ u(n) = \sum_{k=0}^{\infty} h(k) w(n - k), \]

where \( \{w(n)\} \) is a Gaussian white noise of power \( \sigma^2 \).

Propose a scheme for spectral estimation in this scenario. Test your scheme by generating realizations \( \{y(n)\} \) in Matlab (choose your favorite values for parameters \( \{p, \alpha_i, f_i, h(n), \sigma^2\} \)) and forming estimates of the underlying power spectral density.