Dan Baima

OCE 495/496 Bridge Team

**Notes on Dr. Hu’s paper on Mechanical Systems and Signal Processing**

* Signal decomposition & reconstruction -> System Identification
* Prony’s Method/ Techniques: decompose a signal into real and or complex-valued exponential components. Technique for fitting an exponential model to a few equally spaced measured data points.
* Frequency & damping coefficient estimated from signal
* Compute corresponding coefficient, phase angle , N=# time steps
* Second step is an ill-conditioned problem, so round off errors exist (can have significant error)
* To remedy this, the Pth-order equation is converted into a system of p first order ODE’s
* Prony computes eigenvalues of matrix F Vs. DFT
* Prony more time consuming than FFT
* When a signal Is composed of damped harmonic components employing DFT for the signal decomposition will not get target components.
* Although both methods reconstruct original signal from superposing their components , they predict completely different signals. Prony extends the signal based on the superposition of the estimated 5 components.

**FOCUS ON SECTION 4.2**

**An=Amplitude**

**Fn=frequency**

**Θn=phase angle**

**5 Harmonic Components**