

DLTI Difference Equation

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Causal LTI Systems

$$a_N y[n-N] + \dots + a_1 y[n-1] + a_0 y[n] = b_M x[n-M] + \dots + b_1 x[n-1] + b_0 x[n]$$

$$y[n] + a_1 y[n-1] + \dots + a_{N-1} y[n-N+1] + a_N y[n-N] = b_0 x[n] + b_1 x[n-1] + \dots + b_{N-1} x[n-N+1] + b_N x[n-N]$$

$$Q[E]y[n] = P[E]x[n]$$

- **Zero Input Response**
 - **Zero State Response (Convolution with $h(t)$)**
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- **Natural Response (Homogeneous Solution)**
 - **Forced Response (Particular Solution)**

References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] B.P. Lathi, Linear Systems and Signals (2nd Ed)