

Partial Fraction Expansion / Decomposition k_i are 'residues'

$$\frac{\sum_{i=0}^M a_i s^i}{\sum_{i=0}^N b_i s^i} = \frac{(s - z_1)(s - z_2) \cdots (s - z_M)}{(s - p_1)(s - p_2) \cdots (s - p_N)} = \frac{k_1}{(s - p_1)} + \frac{k_2}{(s - p_2)} + \cdots + \frac{k_N}{(s - p_N)}$$

factor
PFE
k_i are 'residues'

polynomial form
factored pole/zero form
Partial Fraction Expansion

$$\frac{(s - z_1)(s - z_2) \cdots (s - z_M)}{(s - p_1)(s - p_2) \cdots (s - p_N)} = \frac{k_1}{(s - p_1)} + \frac{k_2}{(s - p_2)} + \cdots + \frac{k_N}{(s - p_N)}$$

PFE: Repeated Roots

Repeated Roots: Differentiation



Complex Roots: Complex Math

Complex Roots: General Case

Complex Roots: Table Lookup