**Discrete Time Model**

\[
X_0 = \left( I - \prod_{i=k}^{1} e^{A_i t_i} \right)^{-1} \sum_{i=1}^{k} \left( \prod_{j=k}^{i+1} e^{A_j t_j} \right) A_i^{-1}(e^{A_i t_i} - I) B_i u_i
\]

\[
X(T_s) = \left[ \prod_{i=k}^{1} e^{A_i t_i} \right] X_0 + \left[ \sum_{i=1}^{k} \left( \prod_{j=k}^{i+1} e^{A_j t_j} \right) A_i^{-1}(e^{A_i t_i} - I) B_i \right] u_i
\]
Sample Timing

Does it matter?
- In dynamic modeling, it depends on control loop.

System Block Diagram

Incorporate all of this into discrete time model of the plant.
Control Timing

Axi sampling often @ fs when possible → Section 22.1