N Lifting Operator L_N

$$L_N : \{u(k)\}_{k \in \mathbb{Z}^+} \longmapsto \left\{ \begin{bmatrix} u(kN) \\ \vdots \\ u((k+1)N-1) \end{bmatrix} \right\}$$

Denote N lifting of a signal by

$$\tilde{u} := L_N u$$

and that of a PTV system G by

$$\tilde{G} = L_N G L_N^{-1}$$

Note: $\tilde{G}$ is TI if N is a multiple of the period of G

Decentralized Fixed Modes (DFM)

For a TI system Σ, $z_0 \in \mathbb{C}$ is called a DFM if it is an uncontrollable or unobservable fixed mode, or if for z_0 any of the complementary subsystems fails to be complete.