

Dynamical Sampling and Frames

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Dynamical sampling is a term describing an emerging set of problems related to recovering signals and evolution operators from space-time samples. For example, consider the abstract IVP in a separable Hilbert space \mathcal{H} :

$$(0.1) \begin{cases} \dot{u}(t) &= Au(t) + F(t) \\ u(0) &= u_0 \end{cases} \quad t \in \mathbb{R}_+, u_0 \in \mathcal{H},$$

where $t \in [0, \infty)$, $u : \mathbb{R}_+ \mapsto \mathcal{H}$, $\dot{u} : \mathbb{R}_+ \mapsto \mathcal{H}$ is the time derivative of u , and u_0 is an initial condition. When, $F = 0$, A is a known (or unknown) operator, and the goal is to recover u_0 from the samples $\{u(t_i, x_j)\}$ on a sampling set (t_i, x_j) , we get the so called space-time sampling problems. If the goal is to identify the operator A , or some of its characteristics, we get the system identification problems. If instead we wish to recover F , we get the source term problems. In this talk, I will present an overview of dynamical sampling, and some open problems.

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