Near Vector Fields. Characteristic Closeness of Stable Vs. Unstable Motion Waveforms in Infrared Video Frames. Marmara University (MU2025)

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Abstract

This talk introduces results for characteristically close vector fields [4] that are stable or non-stable in the polar complex plane $\mathbb{C}$, extending results in [3, 5]. All characteristic vectors (aka eigenvectors) emanate from the same fixed point in $\mathbb{C}$, namely, $\vec{0}$. Stable vector fields satisfy an extension of the Krantz stability condition [1], namely, the maximal eigenvalue of a stable system lies within or on the boundary of the unit circle in $\mathbb{C}$. In its earliest incarnation by Poincaré, the focus was on the stability of the solar system [6]. Typically, vector fields are used to construct dynamical systems [7, §4]. The focus here is on dynamical systems generated by stable characteristic vector fields (cVfs) in $\mathbb{C}$. In general, a characteristic of an object X is a mapping $\varphi : X \to \mathbb{C}$ with values $\varphi(x \in X) \in \mathbb{C}$ that provide a system profile. Characteristically near stable systems X, Y satisfy the extreme closeness condition from [4], namely, $\boxed{|\varphi(x \in X) - \varphi(y \in Y)| \in [0, 0.5]}$.

Keywords Characteristic, Krantz Stability Condition, Maximal λ-value, Motion Waveform, Near Sets, Polar Complex Plane, Proximities, Vector Field.

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