Border collisions inside the stability domain of a fixed point - DTU Orbit (09/11/2017)

Border collisions inside the stability domain of a fixed point

Recent studies on a power electronic DC/AC converter (inverter) have demonstrated that such systems may undergo a transition from regular dynamics (associated with a globally attracting fixed point of a suitable stroboscopic map) to chaos through an irregular sequence of border-collision events. Chaotic dynamics of an inverter is not suitable for practical purposes. However, the parameter domain in which the stroboscopic map has a globally attracting fixed point has generally been considered to be uniform and suitable for practical use. In the present paper we show that this domain actually has a complicated interior structure formed by boundaries defined by persistence border collisions. We describe a simple approach that is based on symbolic dynamics and makes it possible to detect such boundaries numerically. Using this approach we describe several regions in the parameter space leading to qualitatively different output signals of the inverter although all associated with globally attracting fixed points of the corresponding stroboscopic map.

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