

UNDERSTANDING TIPPING PHENOMENA VIA THE MASLOV INDEX

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We introduce the Maslov index, a powerful topological invariant rooted in classical oscillation theorems, and explore its application in analyzing dynamical systems. The Maslov index has been generalized to detect instabilities in solutions of ordinary and evolutionary partial differential equations. Our focus includes both computational and analytical tools for stability analysis, demonstrating how the Maslov index relates conjugate points to unstable eigenvalues of linear operators. Moreover, we examine how the Maslov index helps identify local minimizers within the Freidlin-Wentzell action functional for systems with small noise. To illustrate these applications, we present examples from a time-reversed van der Pol system and a carbon cycle model.