

# Pseudo $\mathcal{PT}$ Floquet theory

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We introduce the novel concept of the pseudo-parity-time (pseudo- $\mathcal{PT}$ ) symmetry in periodically systems and precisely in Floquet operator. We analyze the dynamics of time-periodic  $\mathcal{PT}$ -symmetric Hamiltonians by means the  $\mathcal{PT}$ -symmetric extension of the Moore and Stedman decomposition of the non-unitary Floquet operator. We establish that the stability of the dynamics occur when the  $\mathcal{PT}$ -symmetry of the time-independent operator  $L$  which define the Floquet operator  $U(\tau)=e^{-iL\tau}$ , where  $\tau$  is the period of the  $\mathcal{PT}$ -symmetric Hamiltonian, is unbroken. This situation correspond to the real quasienergies  $\epsilon_n$ . Nevertheless, when the  $\mathcal{PT}$ -symmetry of  $L$  is broken, which correspond to the complex conjugates quasienergies  $\epsilon_n$ , an instable dynamics arise. As an illustrative example, we studied in greater detail a new example of a the periodically driven oscillators in the  $\mathcal{PT}$ -symmetric harmonic potential.