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$\mathcal{PT}$ **-symmetry Wave Chaos**[1] CARL T. WEST, TSAMPIKOS KOT-TOS, Department of Physics, Wesleyan University, Middletown, Connecticut 06459, USA & MPI for Dynamics and Self-Organization, 37073 Göttingen, Germany, TOMAZ PROSEN, Physics Department, Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia — We study a new class of chaotic systems with dynamical localization, where gain/loss processes break the hermiticity, while allowing for parity-time $\mathcal{PT}$ symmetry. For a value $\gamma_{\mathcal{PT}}$ of the gain/loss parameter the spectrum undergoes a spontaneous phase transition from real (exact phase) to complex values (broken phase). We develop a one parameter scaling theory for $\gamma_{\mathcal{PT}}$, and show that chaos assists the exact $\mathcal{PT}$-phase. Our results will have applications to the design of optical elements with $\mathcal{PT}$-symmetry.

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