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Synergetic effects between chaotic and self-consistent effects observed for wave particle interaction in a TWT upgrade FABRICE DOVEIL, DIDIER GUYOMARC'H, CNRS, umr 7345 Aix-Marseille univ., piim, Marseilles, FR, MEIRIELEN CAETANO DA SOUSA, Instituto de Fisica, universidade de Sao Paulo, San Paulo, BR, YVES ELSKENS, Aix-Marseille univ., umr 7345 CNRS, piim, Marseilles, FR — Beside industrial uses, Traveling Wave Tubes (TWT) are useful to mimic and study plasma-like wave-particle interaction. We upgraded a TWT, whose slow wave structure is a 4 m long helix (diameter 3.4 cm, pitch 1 mm) of Be-Cu wire in a vacuum glass tube. At one end, a cathode injects electrons, radially confined by a constant axial magnetic field. Movable probes, capacitively coupled to the helix, launch and monitor waves with an arbitrary waveform at a few tens of MHz. At the other end of the helix, a trochoidal analyzer allows to reconstruct the beam electron distribution function after its self-consistent interaction with the waves. The new device's observed dispersion relation agrees very well with a sheath model. The measured probe-helix coupling coefficients are used to reconstruct the spatial evolution of a launched wave as it interacts with the beam. For low beam intensity, chaotic effects are observed on the beam. For larger beam intensity, growth and saturation of a launched wave is observed. [1] G. Dimonte, J.H. Malmberg, Phys. Fluids 21, 1188 (1978). [2] S.I. Tsunoda, F. Doveil, J.H. Malmberg, Phys. Rev. Lett. 58, 1112 (1987). [3] F. Doveil, A. Macor, A. Aissi, Cel. Mech. Dyn. Astr. 102, 255 (2008).

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