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Non-linear dynamics and simulation of VO_2 oscillators for microelectronics applications MILINDA PATTANAYAK, Department of Physics & Astronomy, Nano Tech Center, Texas Tech University, MD NADIM F HOQUE, YONG ZHAO, ZHAOYANG FAN, AYRTON A BERNUSSI, Department of Electrical and Computer Engineering, Nano Tech Center, Texas Tech University — Vanadium dioxide (VO_2) is a promising electronic material for emerging technologies. VO_2 undergoes a reversible phase transformation accompanied by several orders of magnitude change in resistivity and hysteresis. Such attributes are ideal for designing novel devices with tunable and reconfigurable characteristics. In this work we investigated two-terminal devices based on VO_2 thin films. The fabricated devices exhibited large amplitude electrical relaxation oscillation under voltage actuation conditions. We developed a circuit equivalent model for the VO_2 based system and excellent agreement between experiment and simulation was verified. We have also analyzed the non-linear dynamics in such systems by deriving the dynamical differential equations for the oscillator circuit. A phase portrait analysis for the VO_2 relaxation oscillator is presented.

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