

# Mutually coupled circuits based on modified voltage differencing transconductance amplifier with tuneable characteristics

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## Abstract

The letter presents a new mutually coupled circuit (MCC) based on a modified voltage differencing transconductance amplifier (MVDTA), designed using the Gorski-Popiel technique [1]. The proposed synthetic transformer (ST) circuit uses two MVDTAs as active elements, and all passive elements are grounded — two capacitors and two resistors. Thanks to the newly established coupling method-connections, it is provided with independent electronic control of primary and secondary self-inductance, as well as mutual inductance, via bias voltages of MVDTAs. In addition, it is very easy to provide the conditions by which symmetrical couplings are achieved. Thorough Pspice simulation time and frequency domain analyses have been performed in order to verify the theoretical analyses. A double-tuned band-pass (DTBP) filter application is given to show the functionality of the proposed MCC.

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