

## Tunable in Phase, out of Phase and T/4 Square-Wave Pulses in Delay-Coupled Optoelectronic Oscillators

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**Abstract :** By exploring the possible dynamical regimes in a prototypical model for mutually delay-coupled OEOs, here it is shown that two mutually coupled non-identical OEOs, besides in- and out-of-phase square-waves, can generate stable square-wave pulses synchronized at a quarter of the period (T/4) in a broad parameter region. The key point to obtain T/4 solutions is that the two OEO operate with mixed feedback, namely with negative feedback in one and positive in the other. Furthermore, the coexistence of multiple solutions provides a large degree of flexibility for tuning the frequency in the GHz range without changing any parameter. As a result the two coupled OEOs system is good candidate to be implemented for information encoding as a high-capacity memory device.

**Keywords :** nonlinear optics, optoelectronic oscillators, square waves, synchronization

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