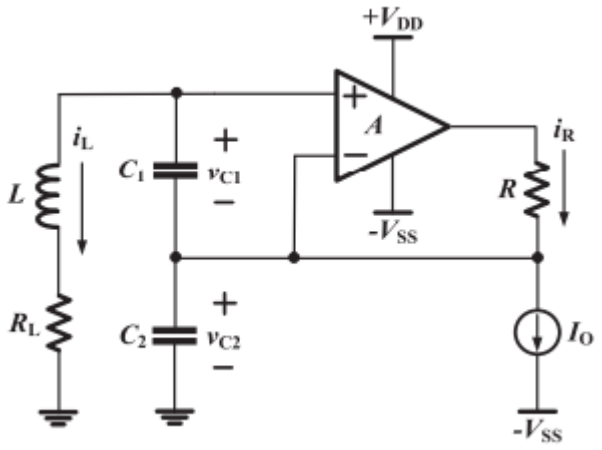
Current-reversible chaotic jerk circuit

Abstract :
A simple current-reversible chaotic jerk circuit is proposed and particularly demonstrates the use of inherently tanh(x) nonlinearity of a single opamp for a chaotic jerk circuit. No additionally nonlinear devices are required. Bifurcation is electronically tunable through a current source in a reversible direction. The largest Lyapunov exponent of either direction forms mirror images, whereas the chaotic attractor of either direction forms antisymmetric images.

Circuit Diagram:



Working:
The circuit shows a simple current-reversible chaotic jerk oscillator based on inherent tanh(x) of a single opamp. A resistor RL = R1+R2 where R1 is an internal resistance of an inductor L and R2 is an external resistor. Voltages vC1 and vC2 are across capacitors C1 and C2, respectively. Currents iL and iR flow through L and a resistor R, respectively. A DC current source I0 is connected to a DC voltage source VSS. Let VS be a saturation voltage of the opamp, and Vr be an arbitrary reference voltage = 1 V.

Applications:

- Cryptography.
- Wide Band communication system.
- Robotics- used to build passive walking biped robots.
- Biology- used in ecological systems such as Hydrology.