Outline

- **pulsed bias oscillator concept for integrated technologies**
  architectural solution for the reduction of both power dissipation and phase noise which relies on time-variant behavior of oscillators systems

- **noise response derivation from Floquet eigenvectors**
  a correct treatment for determination of phase noise caused by noise perturbations

- **design criteria based on eigenvectors displacement**
  circuitual parameters of proposed architecture may be directly designed on noise minimization conditions derived from eigenvectors phase displacement

*Fig.: simplified model of the LC tank pulsed bias oscillator.*
Main achievements

• *methodology for derivation of Floquet eigenvectors*

  approximated analytical calculation of eigenvectors in systems with non derivable points of state variables due to the presence of pulsed bias current

  compact expression of phase displacement between eigenvectors as a linear function of pulse parameters

• *noise minimization conditions*

  bias noise → time varying noise introduced with refilling current of the pulse

  jitter noise → noise proportional to delay time in the positioning of the pulse

  resistance noise → noise due to losses present in the circuit
Outlook

• **eigenvectors phase displacement**

\[ \beta = - \left( 2 \omega_n T_{th} + \omega_n T_1 - 2 \phi \right) \]

approximation valid in case:
- \( T_2 < \ll T \)
- \( Q > 5 \)

• **design criteria for optimal displacement**

bias noise minimization

- \( T_i = 0 \)
- \( \omega_n T_{th} - \phi = \frac{\pi}{4} \)

jitter noise minimization

- \( \omega_n T_1 = \frac{\pi}{2} + 2 \phi \)

jitter exists, i.e. \( T_i \neq 0 \)

resistance and bias noise minimization

jitter exists, i.e. \( T_i \neq 0 \)

**Fig.: capacitor voltage and current of the pulsed generator in time.**