1. Objective

Most analog ICs require a reference current/voltage source.

- Stable against PVT variation
  - P: Process
  - V: Supply voltage
  - T: Temperature

Focus on supply voltage (V) and temperature (T)

2. Background

Original Nagata Current Mirror Circuit

- Improved Minoru Nagata Current Source

3. Proposed Circuit

Conventional circuit by M. Hirano

- Simple design
- Using multiple current mirror circuit with different current peaks
- Sensitive to temperature variation

4. Simulation Results

LTspice

- TSMC 0.18[μm] CMOS model
- Temperature: -30°C, 0°C, 27°C, 60°C

SPICE simulation result

5. Comparison

Conventional circuit

- Proposed circuit

- Proposed circuit is less sensitive to temperature

6. Conclusion

Conventional:
- Peak vicinity is very narrow and sensitive to temperature variation

Proposed:
- Combining positive and negative temperature characteristics
  - Simple
  - Insensitive to a wide range of power supply voltage variation
  - Insensitive to temperature variation

Reference