Title:

Analysis of transient response of KHN biquad active filter

Theory:

KHN biquad is used for implementation at very low frequency bands (3KHz-30KHz). In this time-varying simulation the phase and magnitude of current in any circuit or network which is operated with AC voltage or current source with a specific frequency is examined.

Transient analysis is the analysis of the circuit as it changes from one steady state condition to another steady state condition. The KHN biquad filter offers three output voltage terminals for **high pass**, **band pass** and **low pass** filters.

Improved frequency response, power dissipation and supply range of the KHN biquadratic circuit. It uses a minimum number of op-amps to achieve the same. The various parameters namely center frequency, dc gain, bandwidth, power dissipation and quality factor are all electronically tunable.

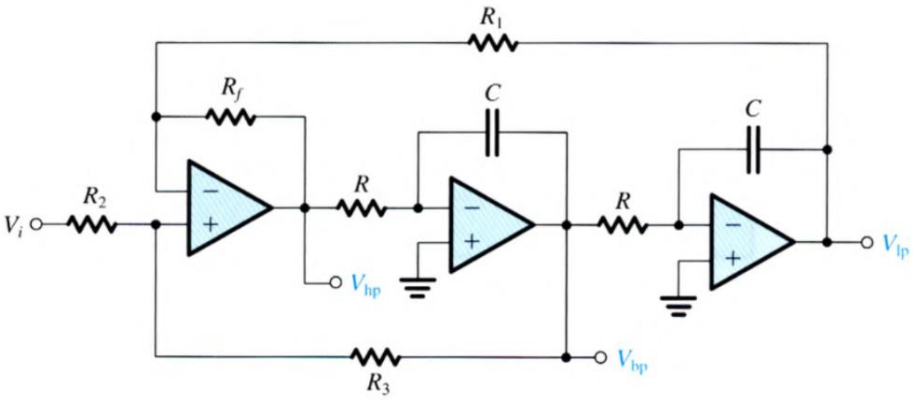

Fig.1 KHN Biquad Active Filter

Schematic Diagram:

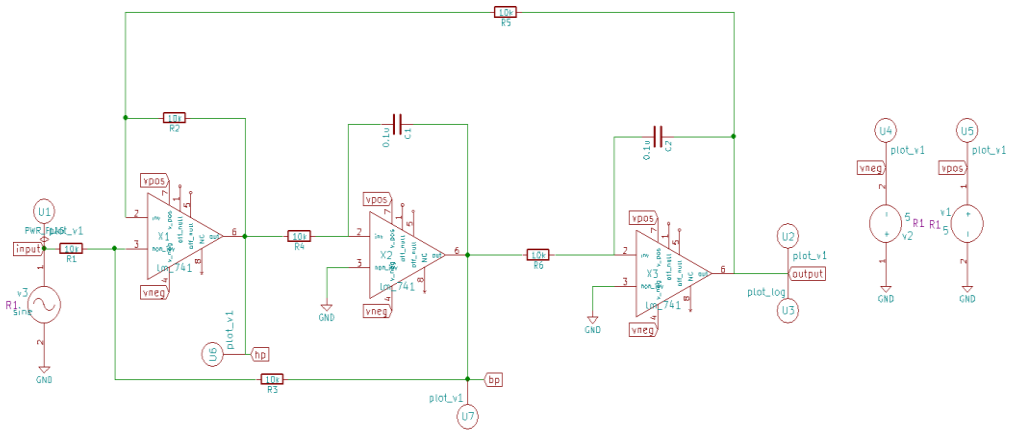

Fig.2 Schematic for KHN biquad

Components used:

- 6 10k ohm resistors
- 2 0.1uF capacitors
- 3 lm_741 op-amps
- 5V DC voltage
- Sine wave source

Simulation Results:

- **Ngspice Plots:**

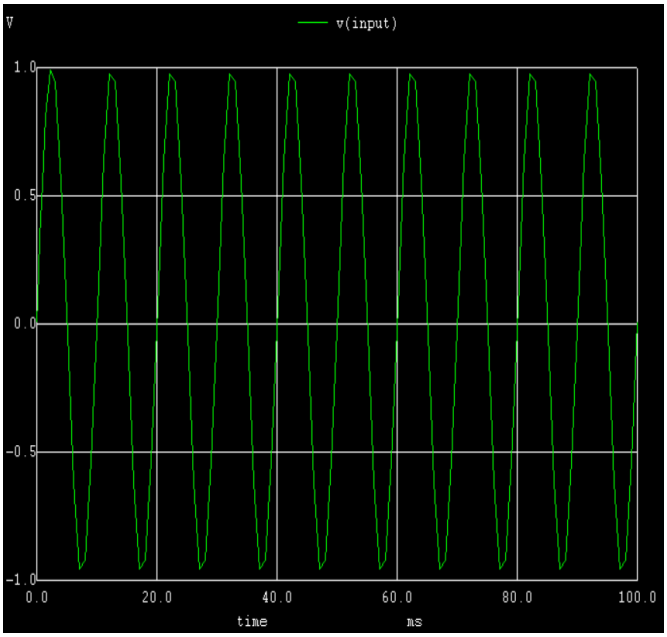

Fig.2 Input

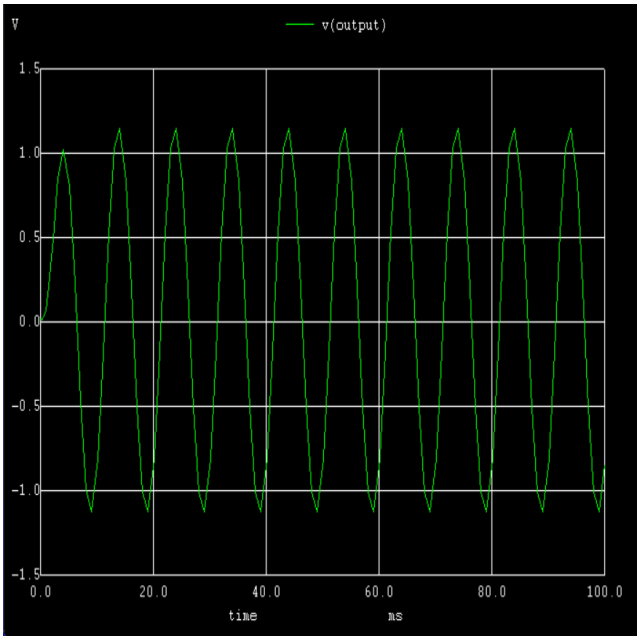

Fig.3 Output/low pass filter

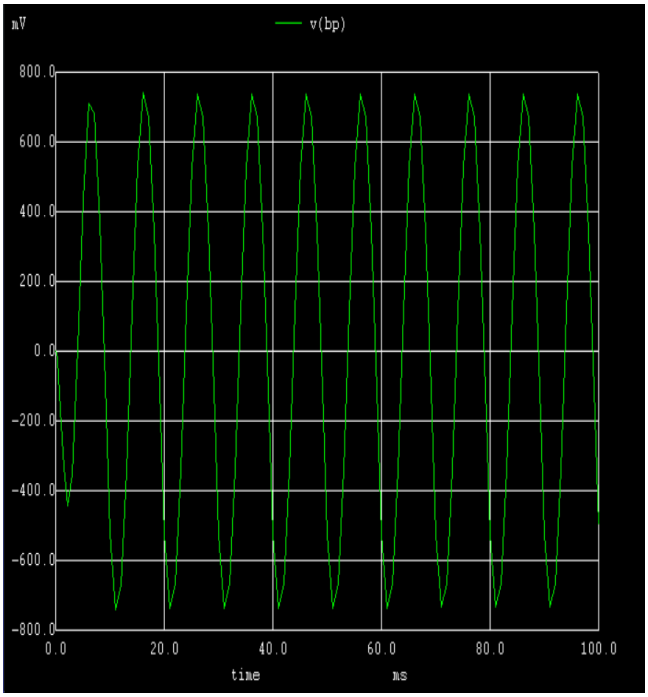

Fig.4 Band pass filter

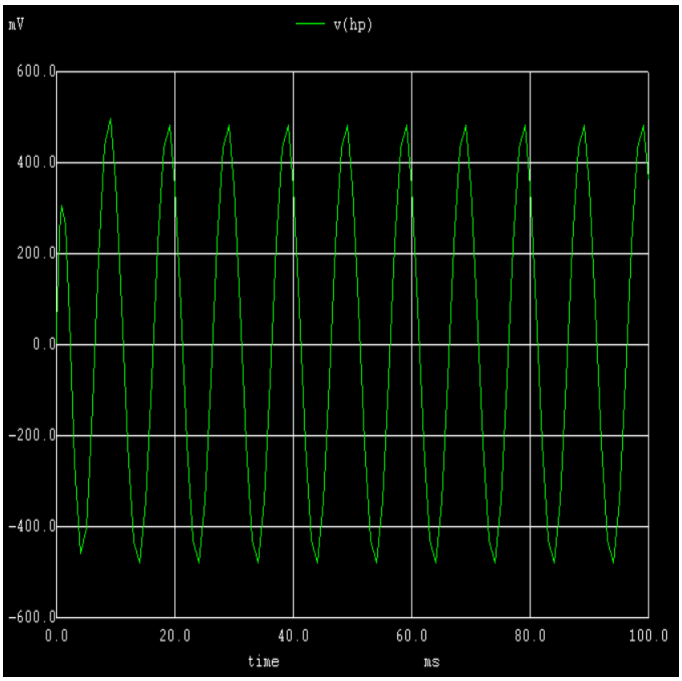

Fig.5 High pass filter

- **Python Plots**:

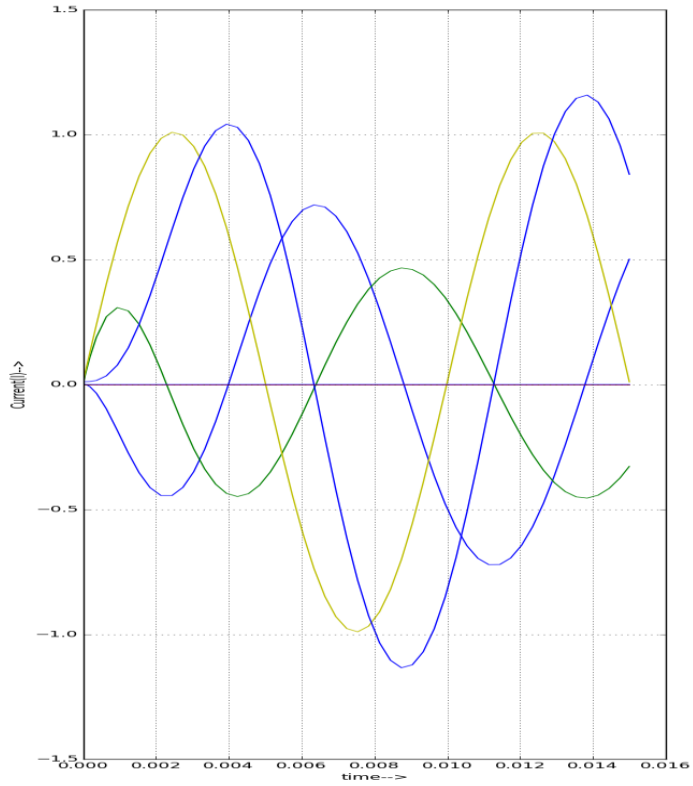

Fig.6 Python Plot

Conclusion:

Thus, the transient response of the KHN biquad filter has been studied using eSim and we get the appropriate waveforms.

References: Design of KHN biquad using operational transconductance amplifier | IEEE Conference Publication | IEEE Xplore

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