

Research Migration Project

<https://esim.fossee.in/research-migration-project>



Name of the participant: DAPHNE STARINA J

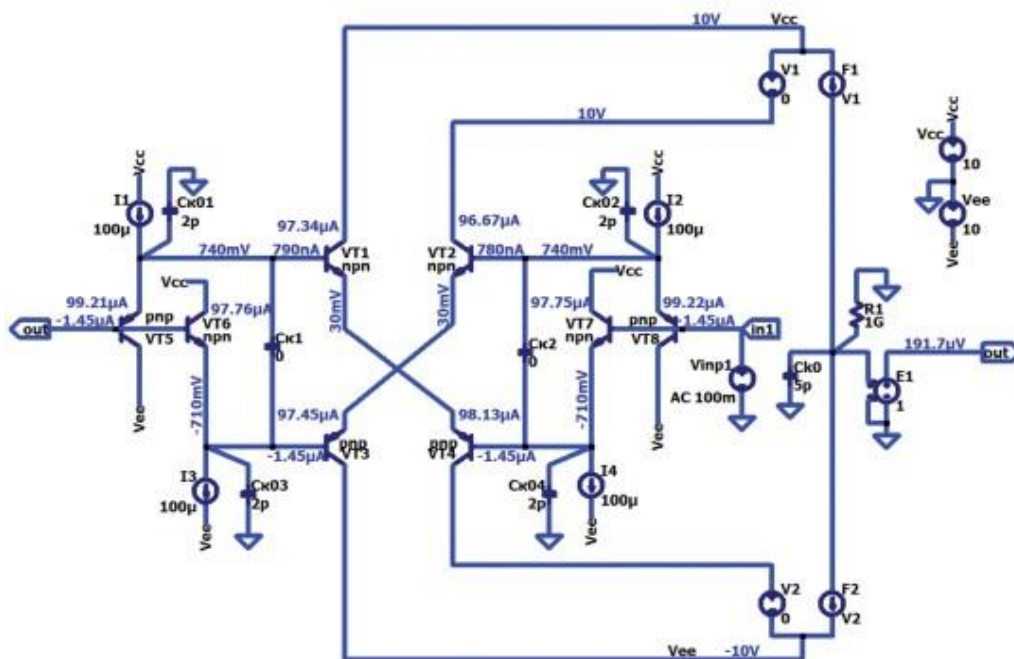
Institution: Department of Electronics and Instrumentation Engineering, Madras Institute of Technology, Anna University, Chennai, Tamil Nadu, India.

Title of the circuit: High-Speed Operational Amplifier with Differentiating Transient Correction Circuits

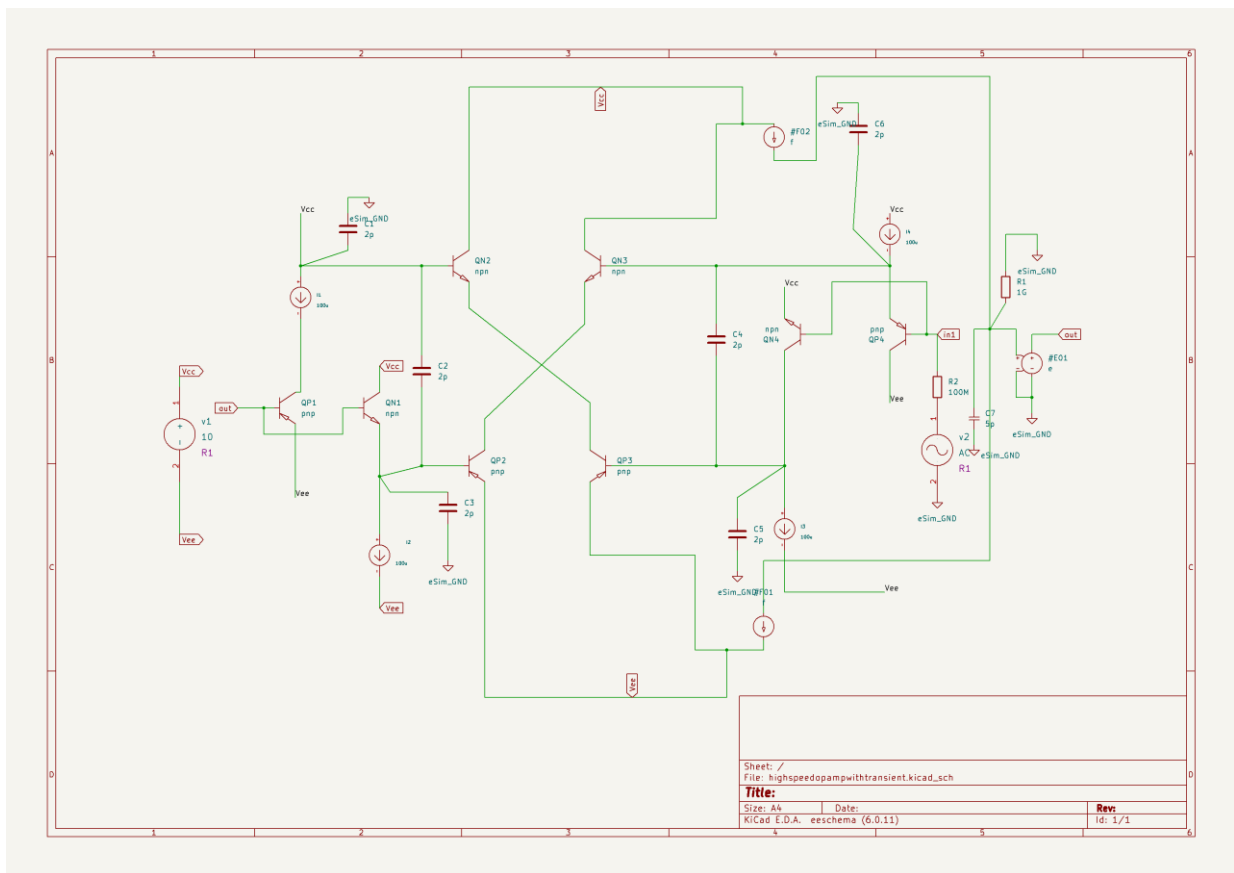
Theory/Description:

This project proposes the implementation of a high-speed operational amplifier (OpAmp) using differentiating transient correction circuits. The design is based on a two-stage operational amplifier architecture consisting of a differential input stage, current mirrors, compensation circuitry, and an output buffer stage. The proposed IEEE design improves the dynamic response of the Op-Amp by introducing differentiating correction capacitors in the internal nodes of the circuit. These correction capacitors inject additional transient current during switching events, thereby accelerating the charging and discharging of internal parasitic capacitances. As a result, the output transition becomes significantly faster without increasing the static power consumption of the amplifier. The circuit mainly consists of Differential input transistor stage, Current mirror biasing circuits, Integrating compensation capacitor for stability, Differentiating correction capacitors for transient enhancement, Output buffer stage.

Circuit Diagram:



Implemented circuit Design on eSim:



Expected Results:

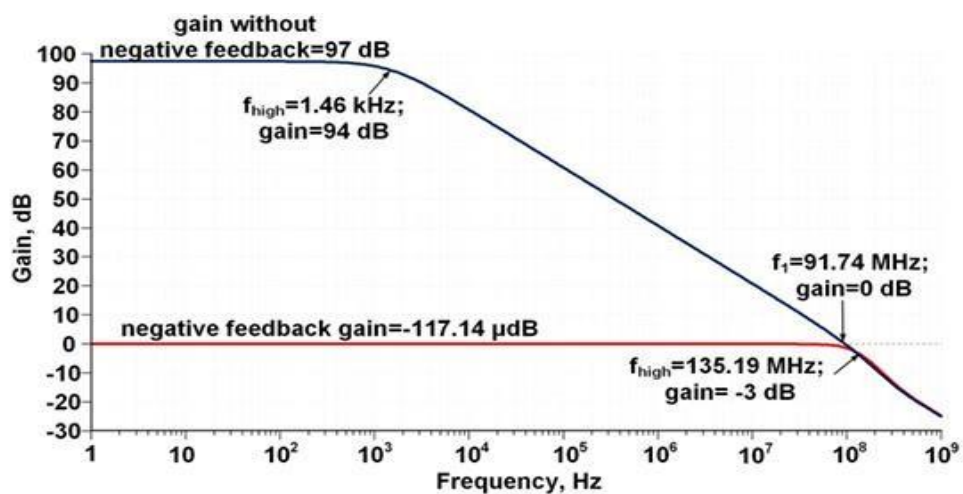
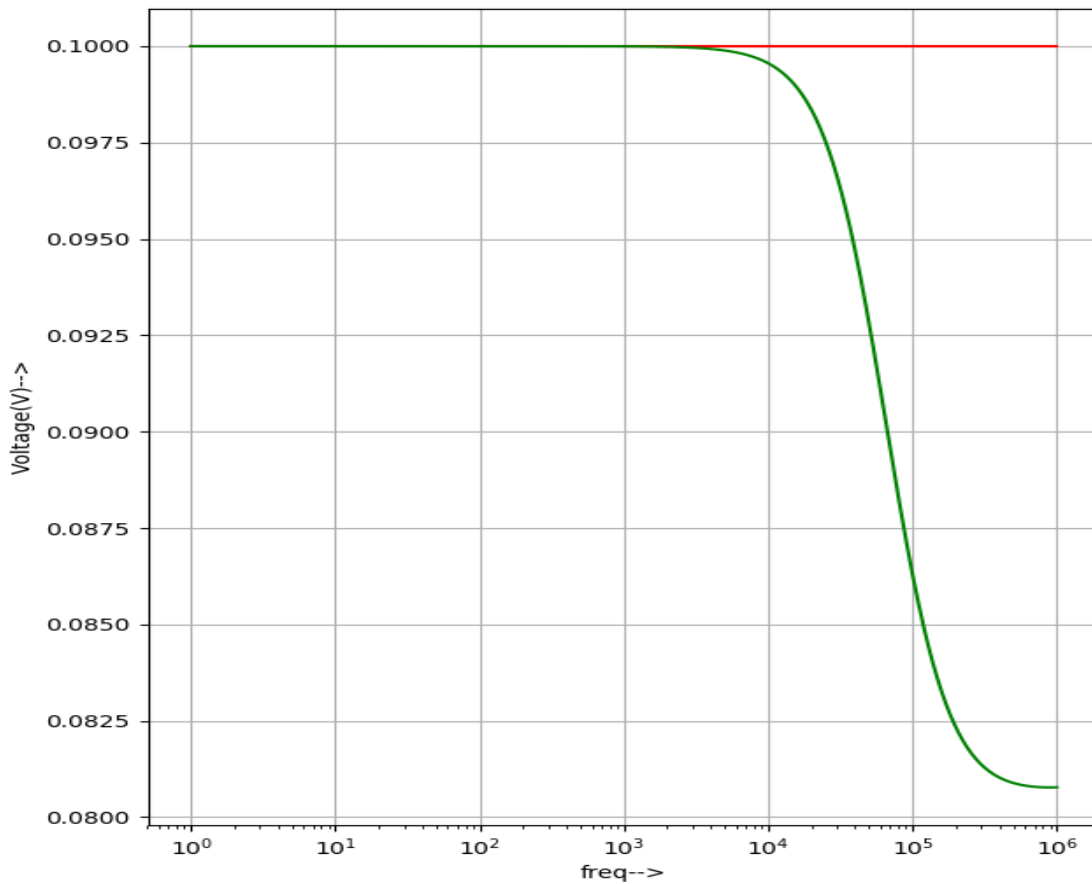


Fig. 6. LAFR of coefficients gain of open-loop and close-loop Op-Amp on Fig. 5.

Results on eSim:



Research Paper/Journal:

Title: High-Speed Operational Amplifier with Differentiating Transient Correction Circuits

Conference: 2022 International Siberian Conference on Control and Communications

Authors: Nikolay N. Prokopenko, Oleg V. Dvornikov, Alexey A. Zhuk **Source /**

References: [High-Speed Operational Amplifier with Differentiating Transient Correction Circuits | IEEE Conference Publication | IEEE Xplore](#)

IEEE Conference Paper (SIBCON 2022)

LTspice Simulation Results from the Research Paper