Title: Design and Simulation of a High-Gain, Low-Power Fully Differential Amplifier with Common-Mode Feedback in eSim.

Problem Statement: Fully differential amplifiers (FDAs) are essential components in modern analog signal processing systems, particularly in high-speed, high-precision analog-to-digital converters (ADCs). They offer superior noise immunity, high linearity, and a wide dynamic range compared to single-ended amplifiers. However, designing FDAs with common-mode feedback (CMFB) poses significant challenges, including achieving high gain, low power consumption, and stable operation across process variations and temperature fluctuations

Key Objectives:

1. Simulate the amplifier to analyse its performance metrics, including:
    - Gain-bandwidth product (GBW): Target ~111 MHz
    - Differential DC gain: Target ~83 dB
    - Phase margin: Target >60°
    - Common-mode rejection ratio (CMRR): Target >250 dB
    - Power supply rejection ratio (PSRR): Target >130 dB
    - Slew rate (SR): Target ~100 V/μs
    - Power consumption: Target <1 mW

Methodology:

1. Schematic Design
2. Simulation Setup
3. Performance Validation

Expected Outcomes:

1. A fully functional FDA circuit designed and simulated in eSim.
2. Simulation results showing performance metrics comparable to or better than those reported in the reference paper.
3. A detailed comparison of the simulation results with the reference paper, highlighting any discrepancies and potential improvements.

Reference Paper:

Yi Zhang, "A High-Gain, Low-Power Fully Differential Amplifier with Common-Mode Feedback for High-Speed and High-Precision Analog-to-Digital Converters," 2024 IEEE 7th International Conference on Automation, Electronics and Electrical Engineering (AUTEEE), 2024.