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A Review on AI-Based Electronic Circuit Simulation Systems

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Abstract: *Artificial Intelligence (AI) has emerged as a transformative force in Electronic Design Automation (EDA), redefining how electronic circuits are designed, simulated, and analyzed. Conventional circuit simulators such as SPICE, Proteus, Multisim, and LTSpice, although accurate, demand extensive manual intervention and advanced technical expertise. This review paper presents a comprehensive analysis of AI-based electronic circuit simulation systems that integrate natural language processing, machine learning, and intelligent graphical interfaces to simplify circuit design. The paper reviews the evolution of electronic simulation tools, discusses the limitations of traditional approaches, and critically examines AI-driven circuit generation and simulation frameworks. The study further highlights educational and industrial applications, identifies existing research challenges, and outlines future directions toward autonomous and intelligent circuit design platforms.*

Keywords: AI-Based Circuit Simulator, Electronic Design Automation, SPICE, Natural Language Processing, Intelligent Simulation, Virtual Laboratories

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