Impact of Fin Height and Fin Angle Variation on Performance Matrix of Hybrid FinFETs

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In this paper, we systematically examined the impact of fin height (H_{Fin}) and fin angle (θ_{Fin}) on the ac performance parameters including total gate capacitance (C_{gg}), RC delay ($C_{gg}V_{DD}/I_{on}$), cutoff frequency (f_T), energy (E), total power (P_{Total}) and leakage power ($P_{Leakage}$) of hybrid FinFETs at the supply voltage, V_{DD} with on current Ion. The RC delay, energy, and total power consumption are the primary factors limiting the operating frequency of the high performance devices. Therefore, these electrical parameters are needed to be addressed in the architectural level of the fin based devices. In this study, a calibrated numerical device simulation tool is used to achieve the best device performances of 14-nm hybrid FinFETs. From the simulated current-voltage (I-V) and capacitance-voltage (C-V) characteristics of hybrid FinFETs, the parameters C_{gg}, $C_{gg}V_{DD}/I_{on}$, f_T, CV^2, P_{Total}, and $P_{Leakage}$ are extracted to analyze the effect of H_{Fin} and θ_{Fin} on the performance-matrices of these devices. Also, this work proposes an optimum structural configuration for 14-nm hybrid FinFET architecture for digital application perspective. **More in IEEE Transactions on Electron Devices (DOI:** 10.1109/TED.2016.2631301**)**