Modelling micro/nano- field effect electron devices

MICRO-623

EDOC lecture

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OUTLINE

I- Alternative modeling of the bulk MOSFET.
- Recalling basics of MOSFETs
- Another way to model MOSFETs
- Short Channel effects in MOS transistors.

II- Modelling the Double Gate FETs.
- The exact solution
- The charge based Model of the DG FET
- Quantum Confinement in DG FET
- Including doping in DG FETs

III- The Gate All around FET

IV- Concept of equivalent parameters in arbitrary FETs.
- The equivalent channel thickness
- The equivalent gate capacitance

V- The Junctionless Field Effect transistor.
- The simplest FET
- Pros and Cons of JL FETs
- Modelling the double gate JL FET
- Asymetric operation in DG JL FETs
- The Nanowire FET

VI- Ballistic transport in nanoscale transistors.
- What is ballistic transport ?
- The virtual source and fluxes
- Is the ballistic FET a vacuum tube ?
- Ultimate contact resistance
- The 'molecular' FET

VII- Modeling the High Electron Mobility FETs (HEMT).
- The energy band shape in AlGaAs HEMT heterostructures
- The concept of charge linearization in HEMT
- The III-Nitride AlGaN HEMT

VIII- Modeling biosensor Nanowires FET and Bio-Sensors
- Basics of solid-electrolyte interaction
- Modeling ISFET Nanowires
- Simulations of ISFET Nanowires

IX- Modeling negative capacitance in multigate FETs
(not sure yet).