

Workshop on Compact Models – Anaheim, May 10-12, 2005

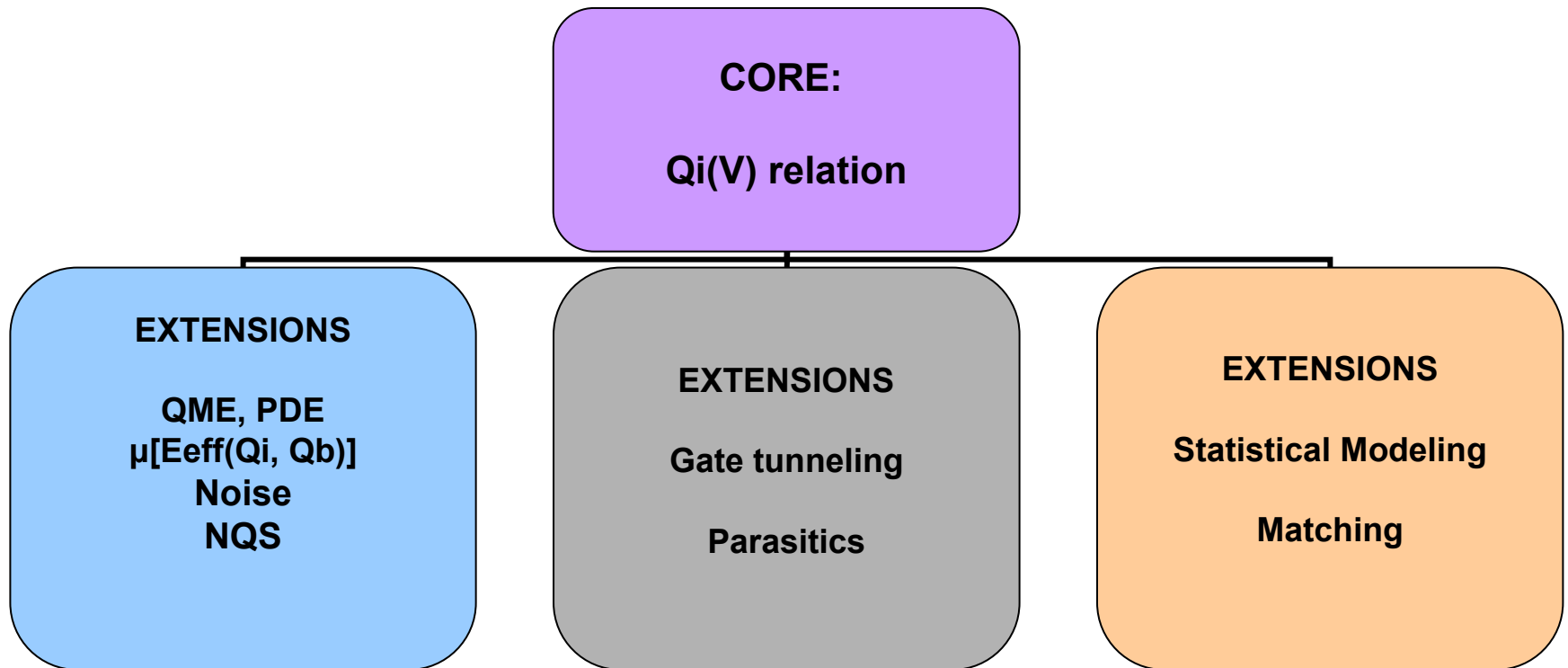
“inversion charge”
vs.
“surface potential” model

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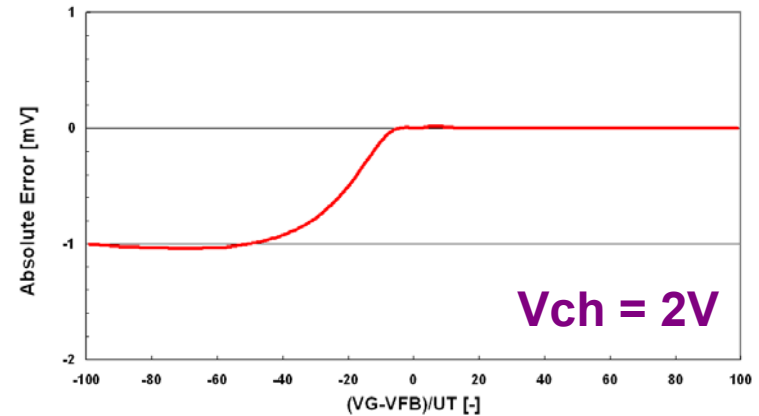
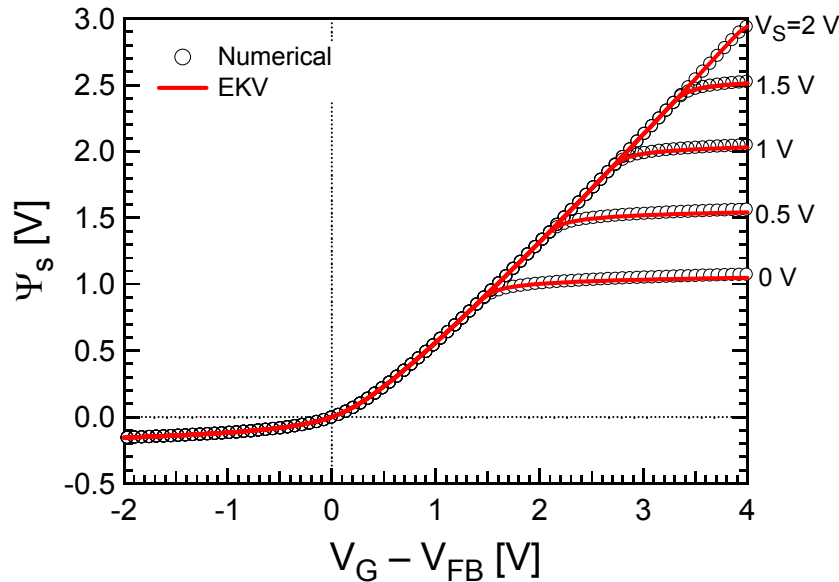


MOSFET model structure



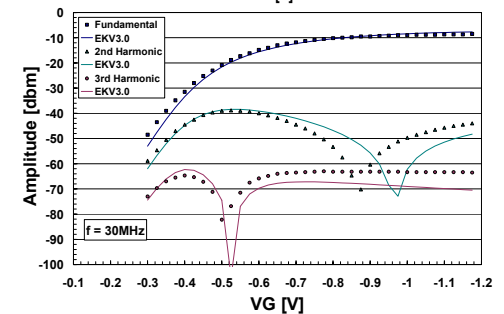
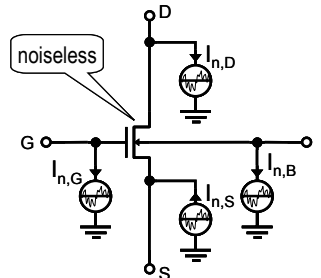
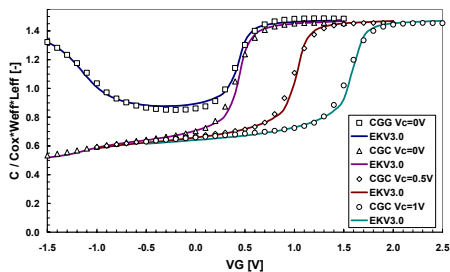
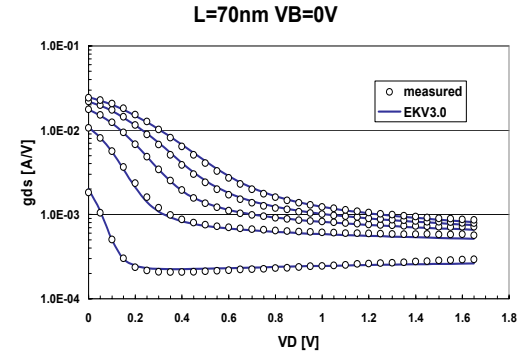
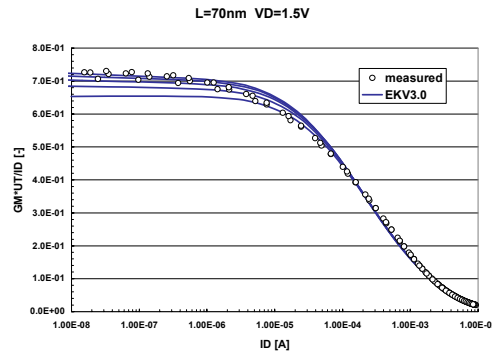
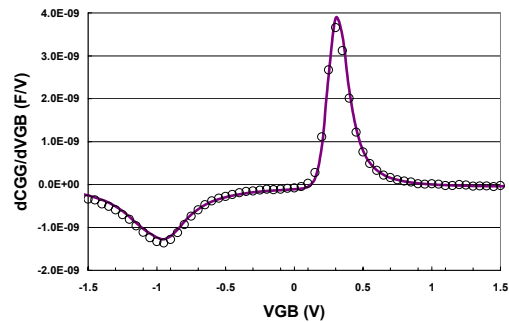
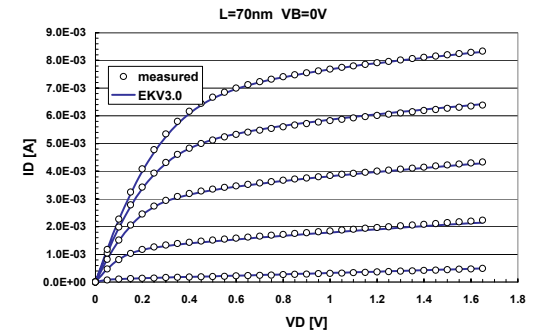
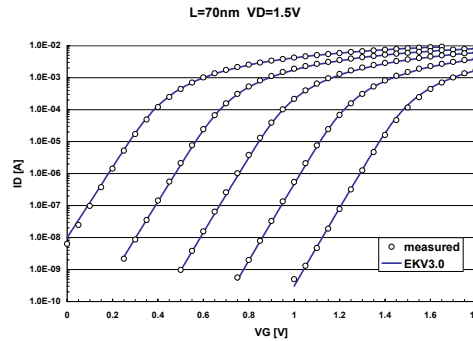
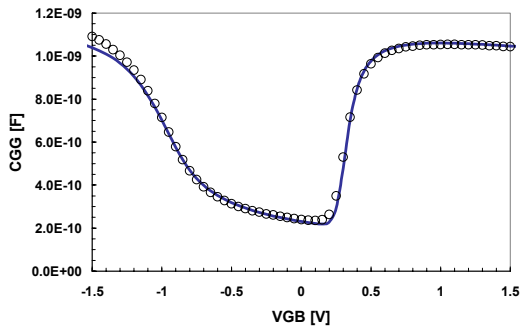
- ❖ CORE (surface potential/inversion charge) of the MODEL is a rather small portion of the overall problem!

Relationship among charge & surface potential model



- “Charge” model needs to be adequately extended to cover depletion/accumulation
- Uses physics-based expressions, no fitting parameters involved
- Small (negligible for analog design) absolute error

Extensions,.....



❖ Geometry, bias-, T-scaling, Noise, Parasitics, Matching,...

Summary

- ❖ Whether “surface potential” or “inversion charge based” model core is used is not of ultimate importance
- ❖ Comparatively more important:
 - ✓ Complete features (coherent model)
 - ✓ Accurate (but let's not overdo it!)
 - ✓ Trade-off complexity-efficiency
 - ✓ Actual use in design: relationship with design methodologies
 - ✓ Consistent availability in simulators