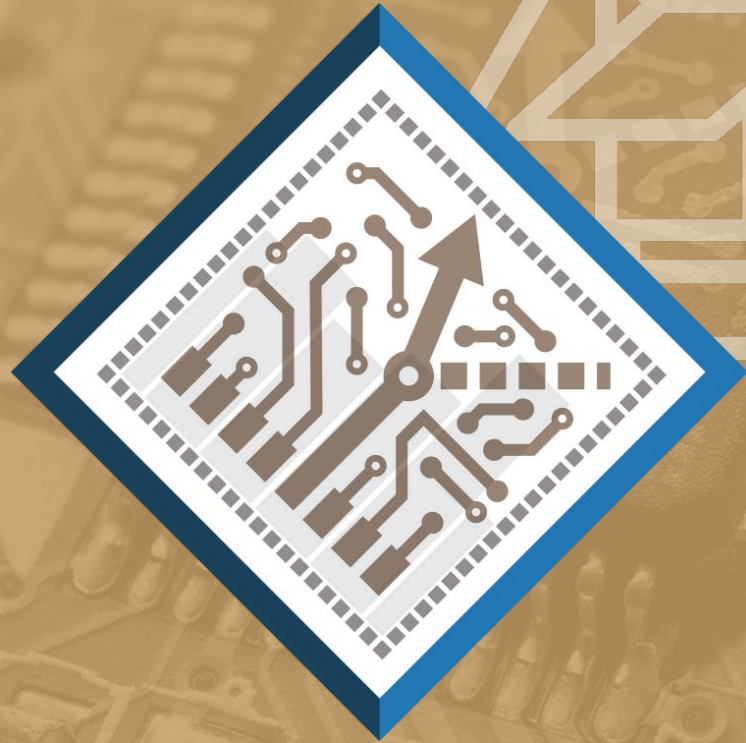


THE ELECTRONICS RESURGENCE INITIATIVE



XYCE OPEN-SOURCE CIRCUIT SIMULATOR



ERIC KEITER

SANDIA NATIONAL LABORATORIES
ALBUQUERQUE, NM



THE ANALOG CIRCUIT SIMULATOR

- SPICE-Compatible syntax
 - Berkeley 3f5

Open Source, GPLv3

- Since September of 2013 (Xyce 6.0)

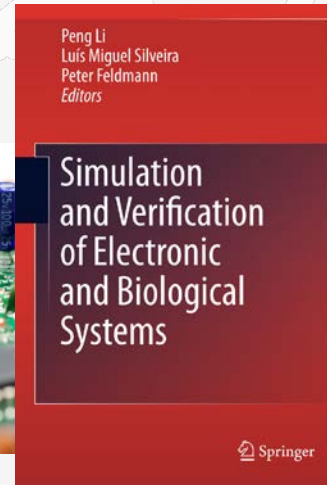
Xyce Release v6.11

- June, 2019
- 24th major release

- **Distributed Memory Parallel**
(MPI-based)

- Unique solver algorithms

- Industry standard models



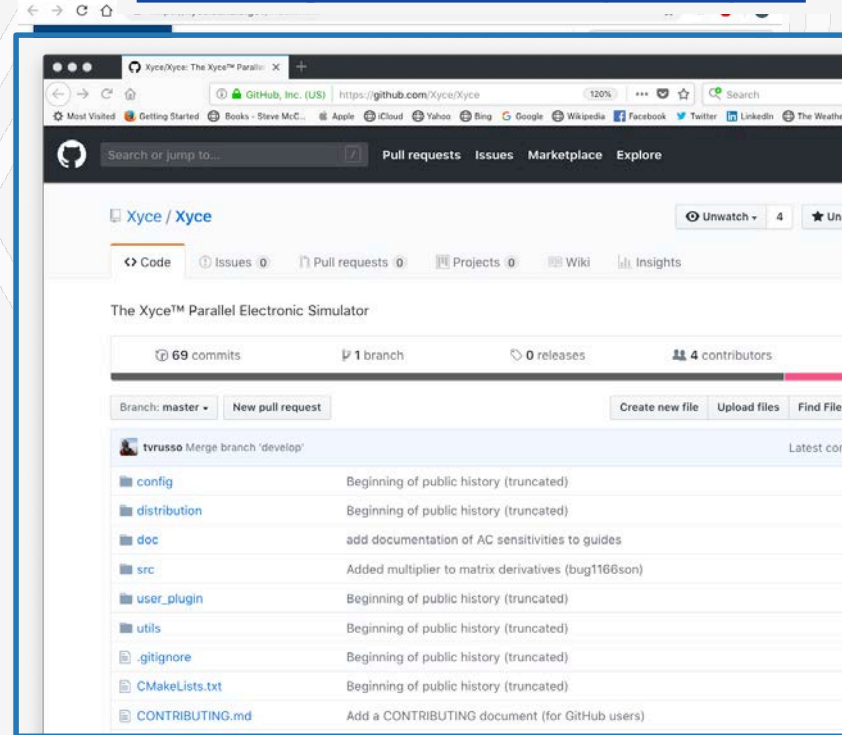
Keiter, et al.,
"Parallel
Transistor-Level
Circuit Simulation"



OBTAINING XYCE

- Two Options:
 - Go to our website and download
 - Go to github.com/Xyce/Xyce and clone
- At original website, many resources are available.
 - **Binary executables** for Windows, OSX and Red Hat Enterprise Linux
 - **Xyce Source code** and **build instructions**
 - **Regression test suite** (several thousand tests)

<https://xyce.sandia.gov>
<https://github.com/Xyce/Xyce>



Documentation

OPEN SOURCE ADVANTAGE: UNLIMITED LICENSES

Corner study

Sampling

 Xyce™
PARALLEL ELECTRONIC SIMULATOR

Proc 0

 Xyce™
PARALLEL ELECTRONIC SIMULATOR

Proc 1

 Xyce™
PARALLEL ELECTRONIC SIMULATOR

Proc 2

 Xyce™
PARALLEL ELECTRONIC SIMULATOR

Proc 3

⋮

 Xyce™
PARALLEL ELECTRONIC SIMULATOR

Proc N

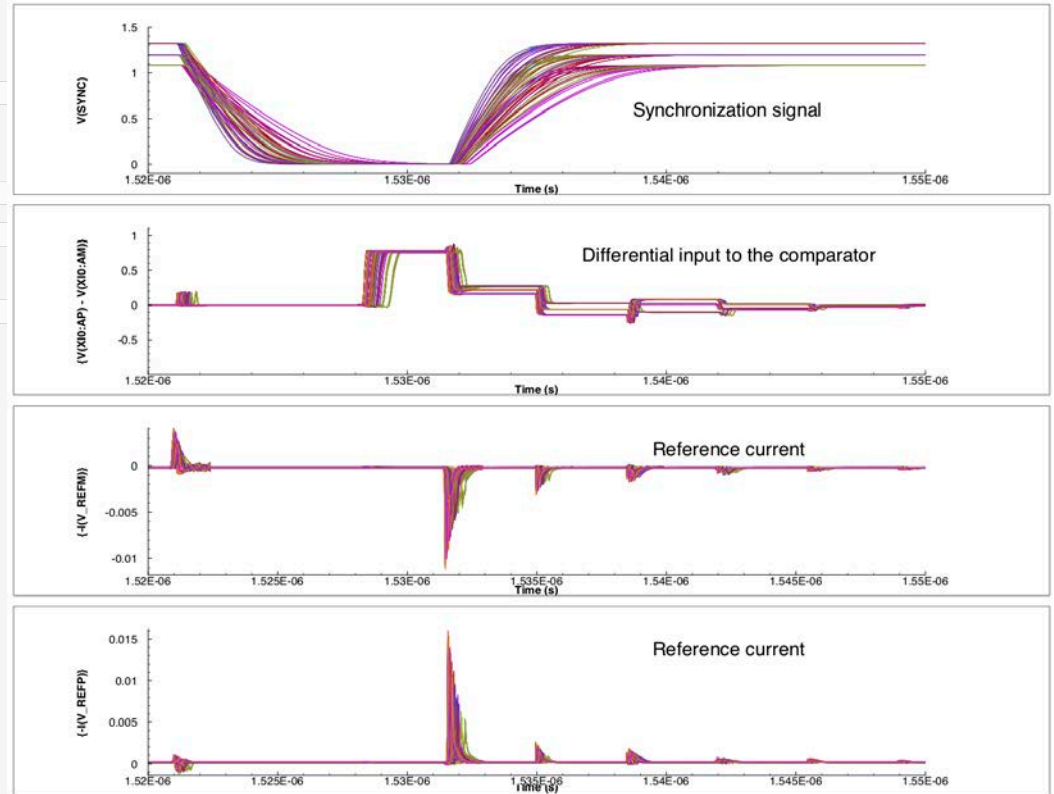
Unlimited licenses allow *unlimited simultaneous simulations*

- Embarrassingly parallel
- a.k.a. "Massively Serial"

Common for smaller companies to have a single commercial simulator license

XYCE DEMO: SAR ADC CIRCUIT CORNER STUDY

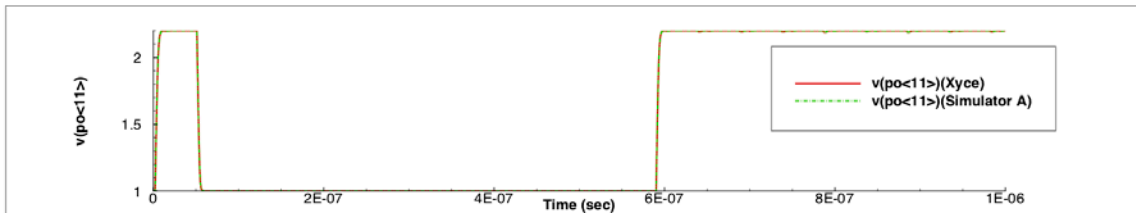
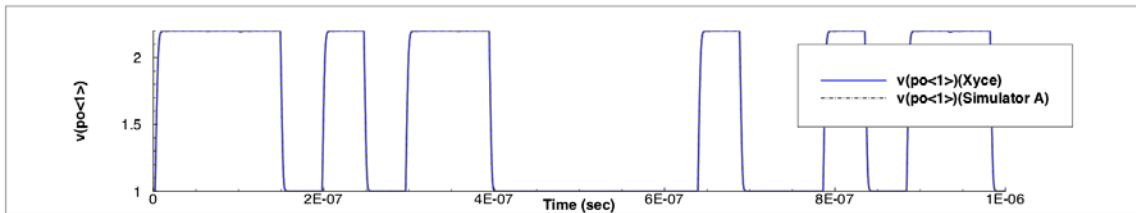
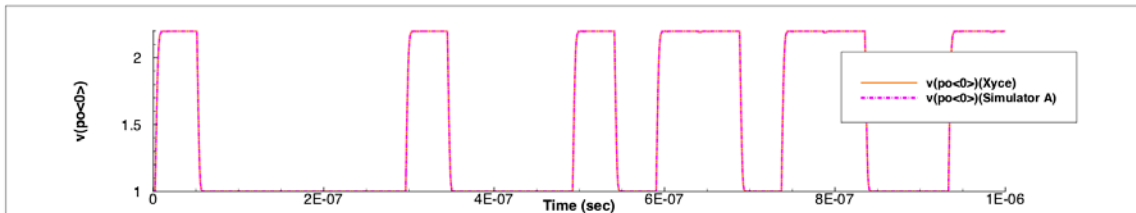
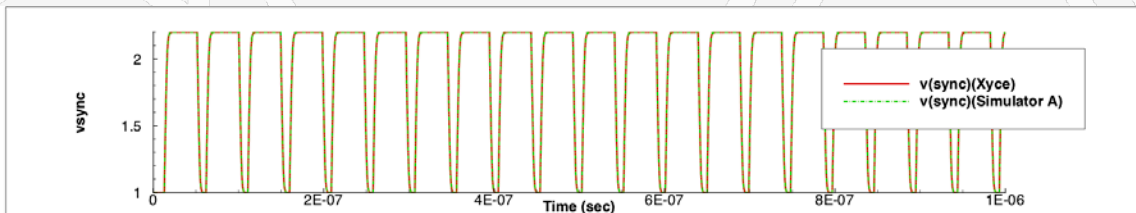
- **SAR ADC** = successive approximation register analog-to-digital converter
- GF65nm 12b SAR ADC by Bindu Madhavan and Edward Lee
- Developed for DARPA-POSH
- See video



SIMULATOR OUTPUT COMPARISON

Results match well RMS Errors small

RMS relative error v(sync) is 0.0434905680015374%
RMS relative error v(po<0>) is 0.0232474456164593%
RMS relative error v(po<1>) is 0.023581461963474%
RMS relative error v(po<2>) is 0.02583082511786%
RMS relative error v(po<3>) is 0.0240096727254828%
RMS relative error v(po<4>) is 0.0166525520072121%
RMS relative error v(po<5>) is 0.00929693070847055%
RMS relative error v(po<6>) is 0.0309201017241085%
RMS relative error v(po<7>) is 0.0230237794341722%
RMS relative error v(po<8>) is 0.0259005260949305%
RMS relative error v(po<9>) is 0.0175662606806119%
RMS relative error v(po<10>) is 0.00940986678122403%
RMS relative error v(po<11>) is 0.00976999004888706%



CORNER STUDY RUNTIME COMPARISON

Corner Study Time (100 corners)

