What You See Is Not What You Get

The Model

- A full PSA for the Loss of Offsite Power of an American nuclear power plant (Epstein & Rauzy 05)
- 136 sequences (95 lead to a Core Damage)
- Core Damage modeled as one Fault tree
- Up to 1551 gates and 2439 basic events per sequence
- 52 Common Cause Groups
- 34 Initiating Events
- Fault Tree was 133 Levels Deep
- Modeled using Fault Tree Linking

What We Did

- Chose the largest Core Damage sequence
- Pruned the tree to only include this sequence
- Calculated all initiators simultaneously
- Obtained the cutsets generated by the FTL engine
- Generated the cutsets with ARALIA (ZBDD) down to different levels until we had the same cutsets as the FTL engine

What We Found

- 462 Cutsets (the same cutsets as with the FTL engine)
- Depth of the solution was only to level 4 (!!!!!!)
- 95% of the modeled gates were not used
- 96% of the modeled basic events were not used
- We then quantified the fault tree to level 4 and created a BDD, ignoring success branches

Moreover …

- MCS-REA quantified frequency was 7.88e-6 for this sequence
- BDD quantified frequency was 4.40e-6 for this sequence
- This is a difference of 1.76 times
- This is a large difference considering we excluded success branches
- We calculated the truncation upper bound: 5.06e-6
- Truncation upper bound is larger than the BDD solution

The fault is not in the tree, my dear Horatio,

But in our models themselves.

- William Shakespeare