Table 4.3: Equivalence fault collapsing for stuck-at faults in benchmark circuits.

Circuit* name	No. of gates	No. of inputs	No. of outputs	Number of faults† All	Collapsed	Collapse ratio
c432	160	36	7	864	524	0.61
c499	202	41	32	998	758	0.76
c880	383	60	26	1,760	942	0.54
c1355	546	41	32	2,710	1,574	0.58
c1908	880	33	25	3,816	1,879	0.49
c2670	1,193	233	140	5,340	2,747	0.51
c3540	1,669	50	22	7,080	3,428	0.48
c5315	2,307	178	123	10,630	5,350	0.50
c6288	2,416	32	32	12,576	7,744	0.62
c7552	3,512	207	108	15,104	7,550	0.50
s27	10	4	1	52	32	0.62
s9234	5,597	19	22	18,468	6,927	0.38
s38584	19,257	12	278	78,854	36,303	0.47

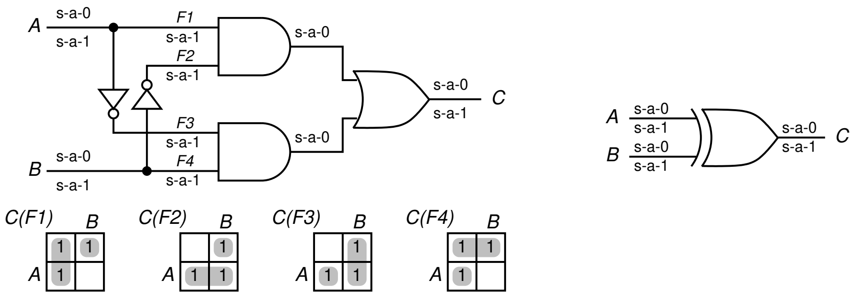

Figure 4.9: Functional equivalence fault collapsing in an exclusive-OR circuit.

will analyze two single s-a-1 faults shown as $F1$ and $F2$. Suppose that $T(F1)$ is the set of all tests for $F1$ and $T(F2)$ is the set of all tests for $F2$. $T(F1)$ contains one vector and $T(F2)$ has seven vectors. As shown in Figure 4.10, $T(F2)$ is larger and completely contains $T(F1)$. According to the following definition, fault $F2$ dominates fault $F1$.

Definition 4.6 *Fault dominance. If all tests of fault F1 detect another fault F2, then F2 is said to* dominate *F1. The two faults are also called "conditionally" equivalent with respect to the test set of F1. For a single-output circuit if two faults F1 and F2 dominate each other, then they are equivalent.*

In an alternative form of fault collapsing, known as *dominance fault collapsing*, we further eliminate the dominating faults from the equivalence collapsed set. For the AND gate shown in Figure 4.10, we will thus eliminate the s-a-1 fault from the output. The figure also shows the three-input AND gate with four faults left after dominance fault collapsing. Since the output s-a-0 is equivalent to any input s-a-0

*See website *http://www.cbl.ncsu.edu/CBL_Docs/Bench.html* for ISCAS benchmarks.
†Revised from earlier printings; these numbers can vary due to modeling differences.