

## Directed Incremental Analysis (C Framework using KLEE)

### TCAS inlined

The TCAS program is an aircraft collision avoidance system from the Software-artifact Infrastructure Repository (SIR). SIR contains 41 versions of tcas, each of which is a mutant of version 0, and contains either one or two functional changes, such as operator mutations, modified constants, and modified control structures. Each version has 10 methods and contains approximately 185 SLOC. We have inlined all the methods manually in order to create one intra procedural program. In the table below there are results for the first nine versions of TCAS.

version	time symbolic	instructions	paths	changed src lines	changed bitcodes	impacted bitcodes
v0v1	26.078	5232	67	1	21	59
v0v2	29.954	6612	95	1	15	135
v0v3	29.55	5916	70	1	12	100
v0v4	26.402	5732	75	1	20	58
v0v5	28.858	6466	88	1	12	109
v0v6	21.973	4864	59	1	21	59
v0v7	0.288	319	1	1	1	1
v0v8	0.272	319	1	1	1	1
v0v9	32.642	6848	99	1	15	135

### wbs results

The Wheel Brake System (WBS), is a synchronous reactive component from the automotive domain. The C program is based on a Simulink model derived from the WBS case example found in ARP 4761. We use the update(int PedalPos, boolean AutoBrake, boolean Skid) method in WBS to evaluate DiSE. This method determines how much braking pressure to apply based on the environment. The Simulink model was translated to C using tools developed at Rockwell Collins. It consists of one class and 231 source lines of code.

version	paths	instructions	static analysis time	time symbolic	changed src lines	changed bitcodes	impacted bc
v0v1	24	2619	1 sec	34 secs	1	3	170
v0v2	24	2619	1 sec	34 secs	1	3	45
v0v3	24	2619	1 sec	34 secs	1	3	57
v0v4	9	488	1 sec	6 secs	2	3	4
v0v5	24	2622	1 sec	33 secs	1	19	241
v0v6	24	2621	1 sec	33 secs	1	5	171
v0v7	24	2603	1 sec	32 secs	2	6	165
v0v8	24	2622	2 secs	33 secs	2	22	241
v0v9	24	2621	1 sec	33 secs	2	8	175