Validating the Numerical Accuracy of Critical Systems: 
A Case Study with Spoat and Space Launcher Flight Software

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1 Introduction

It is well-known that numerical computations are sensible to the computer arithmetic which introduces roundoff errors and possibly makes the results of programs inaccurate. This risk has to be considered in the verification and validation (V&V) phases of a critical system [?] and the needs for V&V techniques increase as quickly as critical tasks relying on complex computations are delegated to computers, for example in cars, aircrafts or space vehicles.

Numalis is a company specialized in numerical accuracy. Numalis software suite aims at bringing solutions for V&V and for the optimization of numerical codes. In particular, Spoat is a V&V tool for numerical accuracy developed by Numalis [?] which performs static [?] and dynamic analyses of source codes in order to determine the worst losses of numerical accuracy on the output variables of programs. Spoat’s static analyzer has been used by ArianeGroup in order to evaluate how the tool could be used at the V&V level for critical software such as space launcher flight software. Spoat has been tested on such code implementing numerical functions and, in this article, we report our feedback about this experiment.

The rest of this article is organized as follows. Section ?? introduces the Numalis Spoat static analyzer. The experiments carried out by ArianeGroup are presented at Section ?? . Finally, section ?? concludes.