

**Bresolin, Davide; Geretti, Luca; Muradore, Riccardo; Fiorini, Paolo; Villa, Tiziano**  
**Formal verification applied to robotic surgery.** (English) [Zbl 1403.93140](#)

van Schuppen, Jan H. (ed.) et al., Coordination control of distributed systems. Cham: Springer (ISBN 978-3-319-10406-5/pbk; 978-3-319-10407-2/ebook). Lecture Notes in Control and Information Sciences 456, 347-355 (2015).

Summary: In this essay, we discuss the application of formal methods for the verification of properties of control systems designed for autonomous robotic systems. We illustrate our proposal in the context of surgery by considering the automatic execution of a simple action such as puncturing. To prove that a sequence of subtasks planned on preoperative data can successfully accomplish the surgical operation despite model uncertainties, we specify the problem by using hybrid automata. We express the requirements of interest as questions about reachability properties of the hybrid automaton model. Then, we compare the different performance of current state-of-the-art tools for reachability analysis of hybrid automata.

For the entire collection see [[Zbl 1310.93004](#)].

**MSC:**

- 93C85 Automated systems (robots, etc.) in control theory
- 93B03 Attainable sets, reachability
- 90B25 Reliability, availability, maintenance, inspection in operations research
- 68Q45 Formal languages and automata

**Keywords:**

[safety property](#); [formal verification](#); [hybrid automaton](#); [reachability analysis](#); [state space representation](#)

**Software:**

[PHAVer](#); [SpaceEx](#); [RSOLVER](#); [HSolver](#); [HyTech](#)

**Full Text:** [DOI](#)

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