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Understanding branch cuts of expressions. (English) [Zbl 1390.68777](#)

Carette, Jacques (ed.) et al., Intelligent computer mathematics. MKM, Calculemus, DML, and systems and projects 2013, held as part of CICM 2013, Bath, UK, July 8–12, 2013. Proceedings. Berlin: Springer (ISBN 978-3-642-39319-8/pbk). Lecture Notes in Computer Science 7961. Lecture Notes in Artificial Intelligence, 136-151 (2013).

Summary: We assume some standard choices for the branch cuts of a group of functions and consider the problem of then calculating the branch cuts of expressions involving those functions. Typical examples include the addition formulae for inverse trigonometric functions. Understanding these cuts is essential for working with the single-valued counterparts, the common approach to encoding multi-valued functions in computer algebra systems. While the defining choices are usually simple (typically portions of either the real or imaginary axes) the cuts induced by the expression may be surprisingly complicated. We have made explicit and implemented techniques for calculating the cuts in the computer algebra programme Maple. We discuss the issues raised, classifying the different cuts produced. The techniques have been gathered in the BranchCuts package, along with tools for visualising the cuts. The package is included in Maple 17 as part of the FunctionAdvisor tool.

For the entire collection see [\[Zbl 1268.68008\]](#).

MSC:

[68W30](#) Symbolic computation and algebraic computation

Cited in **3** Documents

Keywords:

[branch cuts](#); [simplification](#); [symbolic computation](#)

Software:

[BranchCuts](#); [FunctionAdvisor](#); [Maple](#)

Full Text: [DOI](#)