

学术研究

## 程序：物理对象上的操作表达式

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**摘要** 把赋值语句看作物理对象上的操作时, 程序就呈现为物理对象上的操作构成的表达式(简称O表达式)。给出了定义O表达式语法的BNF公式, 并用公理规定O表达式的语义。主动式的O表达式以计算最终结果为目的, 因而相关公理给出的是施行表达式中操作以后的变量与施行之前变量之间的准确依赖关系。反应式O表达式要对外来需求作反应。描述反应的公理规定如何反应。有关通讯的公理要求正确的信息被正确的接受者收到。共享变量公理则给出有关共享变量的性质判断。例子用于说明异步顺序O表达式的性质是如何分析的。

**关键词** [程序](#) [物理对象](#) [物理对象上的操作](#) [物理对象上的操作表达式](#) [语义公理](#)

分类号

## Program: Expressions of Operations on Physical Objects

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### Abstract

A program turns out to be an expression of operations on physical objects (operation expression or O\_expression for short) when assignments are treated as operations on physical objects. BNF formulas are given to define O\_expression syntax while axioms are proposed as semantics of O\_expressions. An active O\_expression computes some ultimate results. As such, an axiom for active O\_expressions defines how a variable after the application of operations in an O\_expression is precisely related to variables before the application. A reactive O\_expression responses to requests from outside. An axiom, describing responses to requests, tells how a response should be made. Axioms on communications make sure that the right messages to be received by the right receivers while axioms about shared variables depict properties concerning shared variables. Examples are given to show how to analyze properties of asynchronous sequential O\_expressions.

**Key words** [program](#) [physical object](#) [operation on physical object](#) [expression of operations on physical object](#) [semantic axiom](#)

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