

# Semantics and Implementation of Higher Order Parameterized Programming

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Modularization is a key to controlling the complexity of large systems. Parameterized programming augments modularization with parameterization, using views to flexibly fit actual parameters to module interfaces, and module expressions to compose systems from component modules; default views relieve users from writing obvious code. This paper extends parameterized programming to higher order modules, and extends views to morphisms, which support both instantiating and refining higher order modules. The paper also outlines a categorical semantics, based on abstract modules as functors on slice categories, and shows how it applies to higher order algebraic specifications, and to higher order partial functions. Examples are given in BOBJ, a recent algebraic specification and functional programming language that supports higher order parameterized programming. The approach is by no means limited to specification and functional languages, but applies even to imperative languages.