MOHAMMAD TAVALLA, York University
The structure of test functions that determine weighted composition operators

In the context of analytic functions on the open unit disk, a weighted composition operator is simply a composition operator followed by a multiplication operator. The class of weighted composition operators has an important place in the theory of Banach spaces of analytic functions; for instance, it includes all isometries on H_p^2.Very recently it was shown that only weighted composition operators preserve the class of outer functions. The present paper considers a particular question motivated by applications: Which smallest possible sets of test functions can be used to identify an unknown weighted composition operator? This stems from a practical problem in signal processing, where one seeks to identify an unknown minimum phase preserving operator on $L^2(\mathbb{R}_+)$ using test signals. It is shown in the present paper that functions that determine weighted composition operators are directly linked to the classical normal family of schlicht functions. The main result is that a pair of functions $\{f, g\}$ distinguishes between any two weighted composition operators if and only if there exists a zero-free function h and a schlicht function σ such that $span\{f, g\} = span\{h\sigma, h\}$.This solves completely the underlying signal processing problem and brings to light an intriguing geometric object, the manifold of planes of the form $span\{h\sigma, h\}$.As an application of the main result, it is proven that there exist compactly supported pairs in $L^2(\mathbb{R}_+)$ that can be used to identify minimum phase preserving operators.