

## Analytic lifts of operator monotone and concave functions

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In the context of free function theory, we review recent results on operator monotone and concave functions in several variables. In particular we study the connection between operator monotonicity and concavity on certain domains. It turns out, that on positive operators monotonicity and concavity are equivalent. Thus we exploit this to construct a non-commutative analytic lift for partially defined functions such as multivariable real functions that are either operator monotone or operator concave. These results can also be applied in more general settings, like in the case of operator means of probability measures.

We will also study a version of monotonicity with respect to the real positive definite order introduced recently by Blecher. It turns out that the real parts of such functions are completely characterizable by operator monotone functions. Moreover if the function is assumed to be free analytic, then it must be affine linear. This latter part of the talk is based on a joint work with Marcell Gaál.

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21 Oct 2020, 12:00 (BST)

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