Non-uniform subdivision, revisited

Kai Hormann

[joint work with Nira Dyn]

Abstract

Subdivision schemes are used to generate smooth curves by iteratively refining an initial control polygon according to certain subdivision rules. In the classical linear, binary, stationary setting, there are just two such rules, which are used throughout all subdivision steps. These schemes are well understood and many tools have been developed for deriving their properties, including the smoothness of the limit curves. For non-stationary schemes, the subdivision rules are not fixed and can be different in each subdivision step. Non-uniform schemes are even more general, as they allow the subdivision rules to be different for every new vertex that is generated by the scheme. The properties of non-stationary and non-uniform schemes are usually derived by relating the scheme to a corresponding stationary scheme and then exploiting the fact that the properties of the stationary scheme carry over under certain proximity conditions. In particular, this approach can be used to show that the limit curves of a non-stationary or non-uniform scheme are as smooth as those of a corresponding stationary scheme. In this talk we will reconsider the design of non-uniform schemes and show that they have the potential to generate limit curves that are smoother than those of stationary schemes with the same support size.