Fast spherical parameterization of genus-0 closed surfaces

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This talk presents a fast algorithm (called FLASH) to compute the spherical harmonic parameterization for genus-0 closed surfaces with or without landmark constraints. FLASH computes the parameterization from the surface onto the sphere. Computing spherical parameterization is computationally expensive because of its nonlinear nature. Existing methods to speed up the computation is to linearize the process, through formulating the optimization problem to the extended complex plane. However, error is inevitably introduced near the pole (or the infinity point). In this work, we present a method to correct the error near the pole using quasi-conformal theories. In addition, by adjusting the Beltrami coefficient of the mapping, which measures the conformality distortion, a diffeomorphic (1-1, onto) spherical parameterization can be effectively obtained. Using the proposed algorithm, the computation of the optimized spherical harmonic parameterization with consistent landmark alignment can be signifcantly speeded up (100 times faster than the conventional method). The proposed method can also be extended to surfaces represented by point clouds. This work is supported by RGC GRF (Project ID: 404612)