## On flank CNC machining of free-form surfaces with curvature-varying milling tools

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We propose an algorithm to initialize milling trajectories for flank CNC machining with general, curvaturevarying milling tools. Our approach generalizes the method for conical tools [1] to arbitrary milling cutters with monotonically increasing distance function. Given a free-form (NURBS) surface and a shape of a rotational milling tool, we look for its motion in 3-space to approximate well the input reference surface. We show that even for a general shape of the milling tool, there exist locally and generically four 3D directions that correspond to a point-surface distance growth determined by the shape of the tool. Integration of such a multi-valued vector field gives rise to a set of integral curves where the straight line segments correspond to the 3D positions of axes of the milling tool. We validate our method on synthetic examples with known exact solutions, and detect manufacturable patches on benchmark free-form datasets.

Joint work with: Pengbo Bo.

## References

[1] Pengbo Bo, Michael Bartoň, and Helmut Pottmann. Automatic fitting of conical envelopes to free-form surfaces for flank CNC machining. *Computer-Aided Design*, 91:84–94, 2017.