

## Milling Stability Prediction on Small Radial Immersion – Comparison SD Method and ZOA Method

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Stability lobe diagram predicted by the zeroth-order approximation (ZOA) method and the semi-discretization (SD) method were compared. The methods yielded similar predictions for high radial immersions under the specified cutting parameters and the cutting tool modal properties. As radial immersion was decreased, the disagreement between the predictions of the two methods grew. For very low radial immersions, the predicted lobe diagram differed considerably. The most prominent difference was an additional set of lobes corresponding to the new type of instability, the period doubling bifurcation which was predicted only by the SD method. Numerical simulation verification of the stability boundaries confirmed that the predictions of the SD were more accurate than those of the ZOA method.

**Keywords:** Milling stability, Lobe diagram, Small radial immersion, SD method, ZOA method

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