

Method for assessing the spatiotemporal resolution of structured illumination microscopy (SIM): supplement

ABDERRAHIM BOUALAM AND CHRISTOPHER J. ROWLANDS*

Department of Bioengineering, Imperial College London, South Kensington, London, SW7 2BP, UK

**c.rowlands@imperial.ac.uk*

This supplement published with The Optical Society on 12 January 2021 by The Authors under the terms of the [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/) in the format provided by the authors and unedited. Further distribution of this work must maintain attribution to the author(s) and the published article's title, journal citation, and DOI.

Supplement DOI: <https://doi.org/10.6084/m9.figshare.13473759>

Parent Article DOI: <https://doi.org/10.1364/BOE.403592>

A method for assessing the spatiotemporal resolution of Structured Illumination Microscopy (SIM): supplemental document

ABDERRAHIM BOUALAM¹ AND CHRISTOPHER J ROWLANDS^{1,*}

¹Department of Bioengineering, Imperial College London, South Kensington, London, SW7 2BP, UK

*c.rowlands@imperial.ac.uk

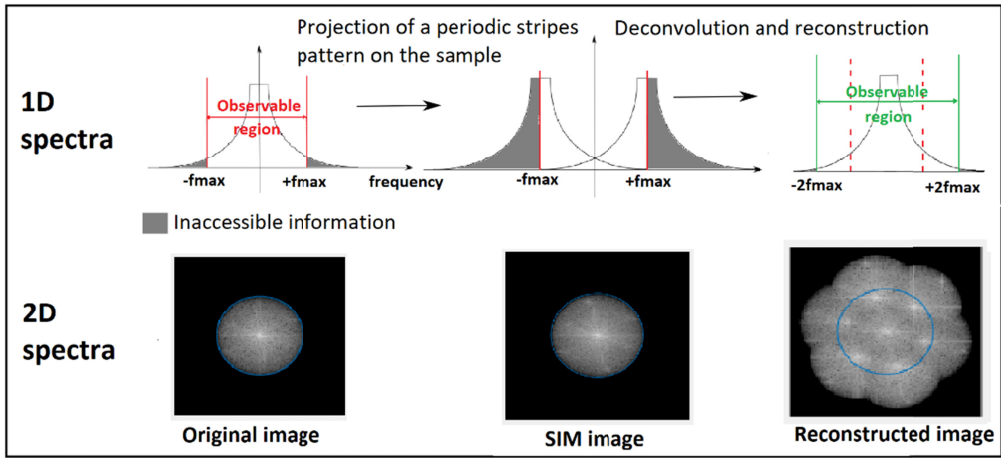


Fig. S1: SIM resolution enhancement, visualized in the Fourier domain. The upper row shows a 1D illustration of the Optical Transfer Function, whereas the lower row plots the magnitude of the Fourier Transform for an illustrative sample. Left: spectra of a widefield image. Middle: spectra of the widefield image illuminated with a striped pattern. Right: spectra of a high-resolution SIM reconstructed image. SIM imaging gives access to an observable region approximately twice as large as that of widefield image (blue circle). Modified from (3).

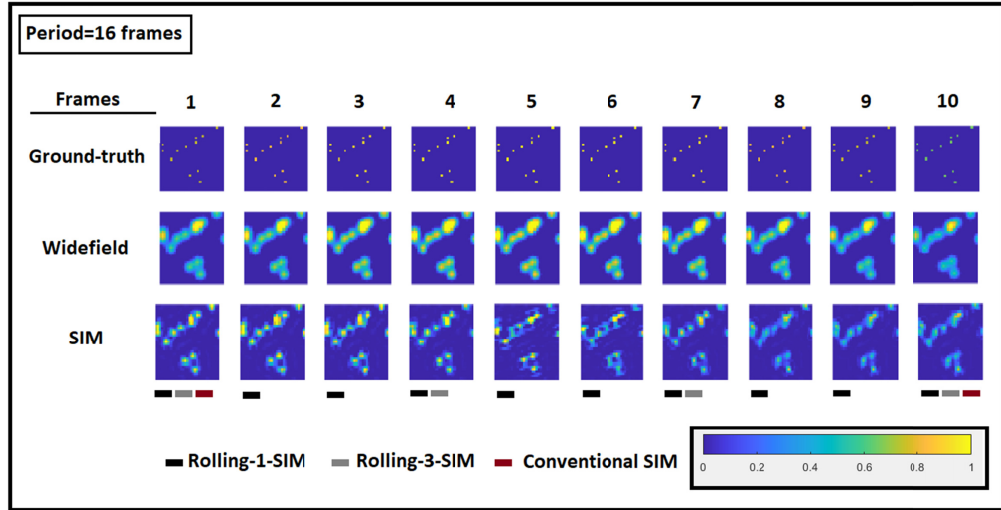


Fig. S2: Illustration of the imaging performance of SIM reconstruction in the presence of pronounced high-temporal-frequency oscillations. In an ideal case, all reconstructed frames would be identical in appearance, because the SIM reconstruction would not be affected by temporal modulation.

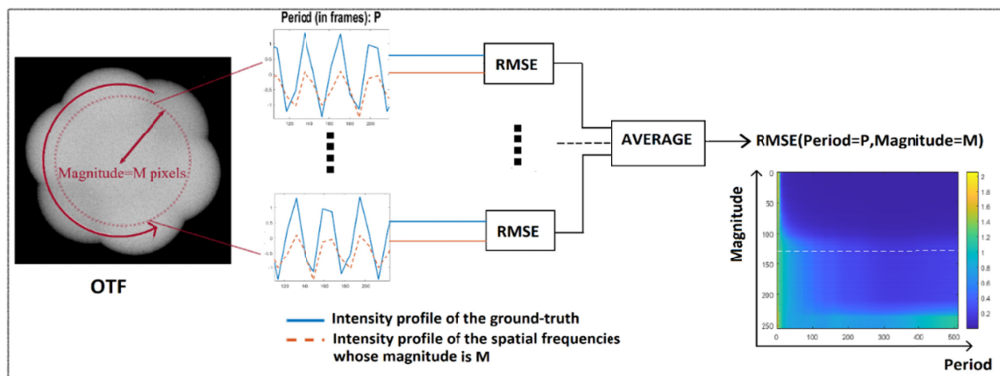


Fig. S3: Calculation of the RMSE metric. RMSE between the ground-truth intensity profile and that of spatial frequencies with the same magnitude M are averaged radially (see the red circular arrow on the OTF) and plotted for different modulation periods P (see right hand side plot)

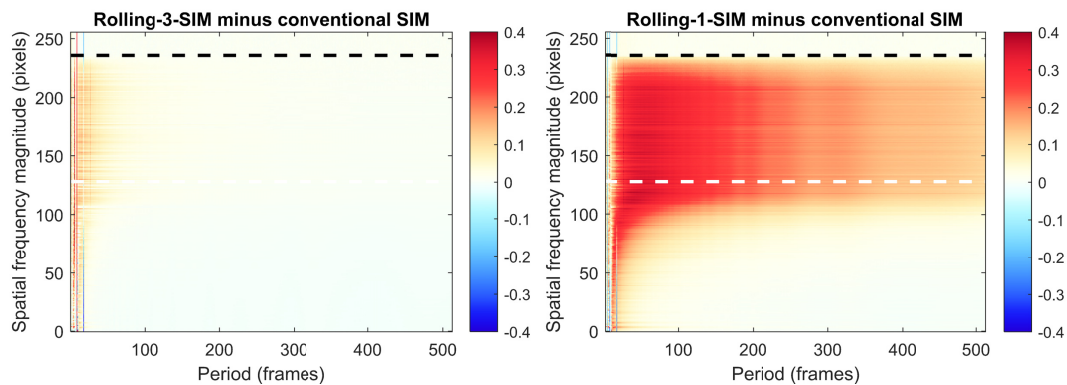


Fig. S4: Difference between the temporal resolution of Rolling-3-SIM and conventional SIM, and of Rolling-1-SIM and conventional SIM, obtained by subtracting the RMSE for conventional SIM from that of Rolling SIM; data displayed with identical colour scales. The white and black horizontal dashed lines highlight the theoretical diffraction limit and the limit of the SIM OTF respectively.