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Selecting the right number of knots for B-spline parameterization of the dielectric functions in spectroscopic ellipsometry data analysis

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B-spline representation of the dielectric functions provides many theoretical and practical benefits for material modeling in spectroscopic ellipsometry. However, the number of knots (and their locations, in general) defines actual performance of B-splines in ellipsometric data analysis. On the one hand, too large number of knots can result in serious overfitting of the experimental data. On the other hand, this number should be sufficient to fit all essential spectral features. Selection of the right number of knots is, in practice, a very subjective and empirically-driven task. In this paper, we discuss the choice of the number of knots utilizing three well-established versions of statistical information criteria in form of Akaike, corrected Akaike and Bayesian Information Criteria (AIC, AICc and BIC, respectively). The criteria establish a compromise between over- and underfitting of experimental data and allow formalized selection of the right number of knots. Effectiveness of the proposed methodology is illustrated using a few real-data examples.

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