The Colouration of Bird Feathers explained by Effective-Medium Multilayer Modelling

Freyer, Pascal

DOI:
10.33612/diss.150815549

Propositions accompanying the dissertation

The Colouration of Bird Feathers explained by Effective-Medium Multilayer Modelling

Pascal Freyer

19 January 2021

1. The transfer-matrix method is a great tool for visualising and understanding the spectral effects of irregular 1-D ordered photonic structures (multilayers).
2. The effective-medium multilayer approximation still requires a more robust theoretical foundation, before it can be considered an independent numerical method for calculating spectral outcomes of iridescent photonic structures in bird feathers (this Thesis).
3. The approximate correspondence of the FDTD and the effective-medium multilayer modelling of the 2-D ordered photonic structure of the peacock feathers indicates that the second dimension is not important for the shape of the reflectance spectrum (Chapter 3).
4. Changing the thickness of the first layers of an optical multilayer can considerably change the reflectance band shape, but only when the number of layers is small enough (Chapter 4).
5. If you try to please everybody, nobody will like it (a variant of Murphy's Law).
6. Life would be more fulfilling if we put our focus on quality rather than quantity.
7. The global COVID-19 pandemic has shown that society can change itself rapidly in the face of the unknown. We have thus lost our last excuse to tackle far more pressing challenges such as the human destruction of our biosphere.
8. Saving this planet is not a technological dilemma, but a social one.
9. Peace will prevail once we can all understand each other, which we can do when we communicate on an equal level, which we can do when we are emotionally competent, which we can become if we have the chance to reflect on ourselves in an environment of trust (ideally in the first years of life).