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Supervisor's assessment of the thesis *„Affordable optical measurement methods for predictive rendering"*, submitted by Tomáš Iser at MFF UK

The thesis has 98 pages, and contains an introduction plus two main sections, and a short conclusion. The introduction establishes the overall goals of the thesis, and outlines the contributions made by the author to other publications that he is a co-author of.

In the first main section, the scientific background of the domain in which the author achieved his core results are presented. The focus here is twofold: on the one hand, modern image synthesis technology is discussed, as it is the intended usage area of the measurement data the author obtains with his contributions: specific emphasis is placed on (bi-)spectral rendering, as this is where the contributions are. On the other hand, the basics of material measurement as an inverse problem are presented, including differentiable rendering technologies.

The second main section presents, one after another, the two journal papers which the author has first authorship of. One is a SIGGRAPH Asia paper, the other was published in Optics Express: both are respectable venues with good impact factors. Both papers offer significant improvements in how one can comparatively easily obtain accurate data for two aspects of spectral rendering that have so far had no real options for practical graphics workflows. The first contribution is, as of 2023, of considerably more practical use for current graphics technology, as translucency computations are an essential feature of all production rendering systems.

On the other hand, fluorescence is currently still only an experimental feature in just a few rendering systems: but this is a chicken and egg problem insofar as the incentives to add this feature to rendering systems was lacking because there were no easy methods for measuring such materials… and without material data, no one would add it to a spectral renderer if accuracy was the goal… but without a spectral renderer that could handle such data, there was only a low incentive to develop such measurement technologies in the first place.

This cycle was now broken by the work of the author: fluorescence can now be comparatively easily measured, so the introduction of this very important appearance feature into mainstream graphics technology can finally proceed.

Overall, the thesis presents two significant contributions to the state of the art of material parameter measurement in Computer Graphics: this sort of ability is a cornerstone of Predictive Rendering, and essential for industrial applications of graphics, such as reliable appearance prediction of 3D printed objects. As discussed in the introduction section, the author also contributed significantly to a number of other high profile publications, particularly in the area of appearance fabrication: so he exactly knew what was needed, and focused on delivering an optimal technique. In doing so, he has demonstrated the ability to lead and complete complex research tasks, and as well as good collaboration skills in long term research collaborations.

Based on these facts, I consider the scientific contribution of the author to be sufficient for defence of a PhD, and I recommend the thesis for acceptance.

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