

# Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

**Autor práce** Federico Forti  
**Název práce** Efficient GPU Path Tracing in Solid Volumetric Media  
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**Studijní program** Informatika      **Studijní obor** Počítačová grafika a vývoj počítačových her

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**Pracoviště** NVIDIA Corporation

## Text posudku:

According to the report (text), designing the parallel version of the rendering algorithm is a challenging process. Plus, there is a need of new better performing approaches due to demand of this process. Though the algorithm at first seems simple but is challenging due to its inherent nature.

The use of GPGPU for data intensive algorithms is not new. So it is understandable why author chose CUDA for designing a high performing algorithm. The author talks about different existing methods in the related work section and comment on their failure to produce the expected results, but fails to mention why some of those existing methods are not good enough. Moreover, it does not have mention to the algorithm that author is going to use to compare and contrast the results.

The background section shows that the author not only has done good research on the GPU technology but also understand the tricky details.

The author has presented the different techniques of the developed algorithm. Though it seems that the author has understanding of these techniques but the numbers presented for these techniques cannot be compared to each other as

1. Units used to represent the numbers are not consistent (compare table 4.2 with other result tables)
2. The size of the image is different for different techniques (see table 4.1 and 4.2)

This can be seen especially in table 4.2. The author provides data for different tile sizes, but did not have any common basis to compare the results of those experiments with each other. Thus the conclusion given in section 4.1.3 falls apart as there is not enough evidence for that.

The regeneration and compaction techniques are quite interesting and challenging to design. In result table, the author has not provided the information on how many threads were regenerated or compacted, if

there were any. So again no conclusion can be made based on the represented data.

In the discussion section, the Mitsuba renderer is used to compare the final results. But it is not mentioned anywhere if Mitsuba renderer is known for its timely performance or not. Moreover, the author has not compared the quality of the rendered image with his techniques to the Mitsuba renderer.

Overall, the report and experiment shows that the author have good understanding about CUDA and GPUs. But the reports needs conclusive numbers to be considered complete.

Questions that need to be addressed during defense:

Were regeneration and compaction algorithms limited by GPU's expensive memory read/write operation? If so, then how and what can be done to resolve those it?

**Práci doporučuji k obhajobě.**

**Práci nenavrhuji na zvláštní ocenění.**

*Pokud práci navrhuje na zvláštní ocenění (cena děkana apod.), prosím uveďte zde stručné zdůvodnění (vzniklé publikace, významnost tématu, inovativnost práce apod.).*

**Datum** 22. January 2018

**Podpis**