Scientific Visualization – Homework 7
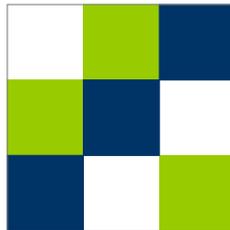
Submission: June, 18th, 2020, 10:15 am, via email

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1. Exercise (6 points)

Let $\mathcal{P} := \left\{ p_0 = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}, p_1 = \begin{pmatrix} 0 \\ 2 \\ 0 \end{pmatrix}, p_2 = \begin{pmatrix} 0 \\ 0 \\ 2 \end{pmatrix} \right\}$ define the vertices of a triangle $\mathcal{T}$ in $\mathbb{R}^3$.

Further, there is the following image of size $[0,2] \times [0,2]$ given:

1.) Determine a texture map for the given situation by projecting $\mathcal{T}$ to the $x_0 x_1$-plane.

2.) Sketch your result. Sketch the top view of $\mathcal{T}$ after projecting and remapping the textured triangle.

2. Exercise (5 points)

Show the following statements about *isometries*:

1.) Let $\varphi : \mathbb{R}^n \to \mathbb{R}^n$ a linear map. Then φ is an isometry if and only if $|\varphi(x)| = |x|$ for all $x \in \mathbb{R}^n$.

2.) Isometries are injective.

3. Exercise (5 points)

Create a textured house having a square base and a hip roof. Therefore, find or create fitting textures. Submit executable JVX, JVD, and a snapshot in PNG of your result.

Total: 16