

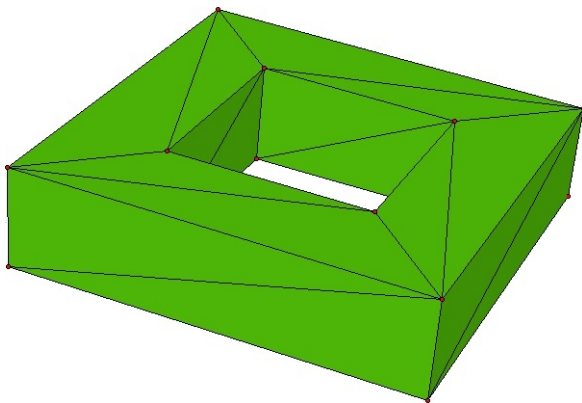
Differential Geometry III – Homework 07

Submission: December 19, 2018, 12:15 am

1. Exercise

(4 points)

Consider the following simplicial surface T in \mathbb{R}^3 :



Give two examples of (non-trivial) curl free vector fields v, w on T which are no gradient vector fields and which are orthogonal resp. the L^2 product:

$$\langle\langle v, w \rangle\rangle := \int_T \langle v, w \rangle dx = \sum_{\Delta \in T} \int_{\Delta} \langle v, w \rangle dx.$$

2. Exercise

(4 points)

Show the following theorem from the lecture: Let M be a simply connected simplicial surface and let $v \in \Lambda^1(M)$. Then

$$\text{curl}(v)|_p = 0 \quad \forall p \in M^{(0)} \Leftrightarrow \exists f^* \in S_h^* \text{ such that } \nabla f^* = v.$$

Construct f^* .

Total: 8