Planar Quads in free-form Architecture Surfaces

Christian Dimitri, UPC BarcelonaTech

September 2018

Abstract

This chapter will discuss briefly the state of the art related to the Planar Quads Meshes, and how they are implemented in architecture. Therefore we will show the solutions behind the available softwares and the different techniques related to variantes researches achieved within this topic in the last twenty years. In addition to that we will try to cover all the techniques, by implementing them using the available tools. In the end the results will be analyzed regarding the economical and aesthetical properties for constructable planar quadrilateral panels.

1 State Of The Art:

1.1 Architecture Implmentations

1.2 Software Tools:

1.2.1 GH_Kangaroo

1.2.2 Evolute

2 What are Planar Quad Meshes ?

##PQ Strips

3.2.3 Planar Quads Perturbation

3.2.4 Subdivision

3.2.5 Generation of Conical Meshes

3.3 Planar Quads by Conjugate Direction Field(CDF):

3.3.1 What is a CDF on a Triangular Mesh,

3.3.2 Types of CDF suited for PQ meshes:

3.3.2.1 N-Rosy Field,

3.3.2.2 Fields of Transverse Conjugates Directions(TCD),

3.3.2.3 Statics and Stress Mapping Fields.

3.3.3 Types of Generating a Quad-Dominant Mesh from a CDF:

3.3.3.1 Level Set Method,

3.3.3.2 Stream Lines after optimizing the CDF.