

A STEP Based Topology and Geometry Description for Grid Generation

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Abstract

These notes will present the parts of the STEP standard relevant to hierarchical grid generation. Both the STEP data representation and its storage on files will be addressed. An extension to the STEP storage format will be proposed to represent the actual grid generation parameters. Some comments will be given with respect to the practical use of commercially available CAD packages. Finally, a graphical user interface will be discussed which allows to interact with the topological model in order to provide the grid generators with their necessary data.

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List of Symbols

B-Rep	: Boundary Representation
BEM	: Boundary Element Method
CAD	: Computer Aided Design
CSG	: Constructive Solid Geometry
d	: the degree of a B-spline
F	: focal length
BEM	: Finite Element Method
GCL	: Grid Command Language
ISO	: International Standardization Organization
k	: the number of control points in a B-spline minus one
m	: the multiplicity of a B-spline knot value
N	: a B-spline basis function
NURB	: Non-Uniform Rational B-spline
\vec{n}	: the unit normal vector on a surface
\vec{P}	: a control point of a B-spline
R	: radius
\vec{r}	: a point position in world coordinates
SDAI	: Standard Data Access Interface
STEP	: STandard for the Exchange of Product model data
t	: parameter along a curve