

# Table of Contents

Introduction	3
0.1 Computer Aided Geometric Design	3
0.2 Deep Learning	5
0.3 Problem presentation	6
0.4 Contributions and Thesis outline	7
PARTE I	
1. Preliminaries	15
1.1 Adaptive spline constructions	15
1.2 Deep learning with neural networks	27
2. Data fitting schemes with hierarchical splines	39
2.1 Interpolation and weighted least squares	40
2.2 Hierarchical quasi-interpolation with adaptive spline constructions	56
2.3 Industrial applications for hierarchical QI spline fitting	63
PARTE II	
3. Parameterization for point cloud spline fitting	71
3.1 PARCNN: parameterization of gridded data with Convolutional Neural Networks	72
3.2 PARGCN: parameterization of scattered data with Graph Convolutional neural Networks	88
3.3 BIDGCN: parameterization of scattered data with boundary information	108

# CONTENTS

## PARTE III

4. Moving parameterization	129
4.1 Alternating fitting schemes: A-PDM, A-TDM, A-HDM, A-QI	130
4.2 Adaptive alternating fitting schemes	139
4.3 Adaptive fitting with joint-optimization	150
4.4 Industrial applications with adaptive A-PDM and A-QI	159
5. Conclusion and future development	165
References	166
List of Acronyms	180
Analytical Index	185