# TABLE OF CONTENTS

| LIST OF TABLES                   | ix  |
| LIST OF FIGURES                 | x   |

**Chapter**

1. Introduction                               | 1   |
2. Visualization techniques for trivariate data | 6   |
   2.1. Existing methods and terminology         | 6   |
   2.2. Domain subdivision and transparency techniques | 9   |
   2.3. Slicing methods                          | 16  |
3. Trilinear contour approximation for trivariate data | 21  |
   3.1. Previous work and basic definitions       | 21  |
   3.2. Piecewise triangular contour approximation for rectilinear data | 28  |
   3.3. Computing topological information for a piecewise triangular trivariate contour approximation | 42  |
   3.4. Gradient approximation for rectilinear data | 47  |
4. Curvature approximation for triangulated surfaces and trivariate functions | 56  |
   4.1. Introduction and essential terms of differential geometry | 56  |
   4.2. Curvature approximation for triangulated two-dimensional surfaces | 62  |
   4.3. Curvature approximation for triangulated three-dimensional graphs of trivariate functions | 78  |
5. Data reduction for triangulated surfaces | 91  |
   5.1. Existing schemes and necessary definitions | 91  |
   5.2. Triangle reduction for triangulated two-dimensional surfaces | 102 |
6. A triangular tangent plane continuous surface | 123 |
   6.1. Introduction | 123 |
   6.2. The conic curve scheme | 128 |
   6.3. Computing the patch building blocks | 132 |
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Conclusions</td>
<td>140</td>
</tr>
<tr>
<td>References</td>
<td>143</td>
</tr>
</tbody>
</table>