

# Contents

Acknowledgements	i
Abstract (English/Français)	iii
List of figures	ix
List of tables	xiii
<b>1 Introduction</b>	<b>1</b>
<b>2 State of the art</b>	<b>11</b>
<b>3 Scope of the thesis</b>	<b>23</b>
<b>4 Mathematical framework</b>	<b>27</b>
<b>5 <math>\{225\}_\gamma</math> habit planes in martensitic steels: from the PTMC to a continuous model</b>	<b>39</b>
<b>6 Accommodation of the <math>\{225\}_\gamma</math> habit plane by dislocations</b>	<b>57</b>
<b>7 Intricate morphologies of laths and blocks in low-carbon martensitic steels</b>	<b>65</b>
7.1 Introduction . . . . .	66
7.2 Method . . . . .	71
7.3 Experiment . . . . .	73
7.4 Crystallographic interpretation and discussion . . . . .	81
7.5 Conclusion . . . . .	92
<b>8 Variant selection in surface martensite</b>	<b>99</b>
<b>9 On the chevron morphology of surface martensite</b>	<b>113</b>
<b>10 Variant Selection in Fe-20Ni-1.8C under Bending</b>	<b>129</b>
<b>11 Effect of tensile deformation on variant selection in <math>\{225\}_\gamma</math> plate martensite and <math>\{557\}_\gamma</math> lath martensite</b>	<b>143</b>
<b>12 General discussion</b>	<b>159</b>
	vii

<b>13 Conclusions and perspectives</b>	<b>169</b>
<b>A Supplements to <i>Variant selection in surface martensite</i></b>	<b>173</b>
A.1 Characterization at lower magnification . . . . .	173
A.2 Additional simulations . . . . .	174
A.3 Isothermal surface martensite . . . . .	178
A.4 Crystallography of the habit plane . . . . .	179
A.5 The PTMC solutions . . . . .	180
A.6 Quantitative analysis of the variant selection prediction . . . . .	183
A.7 The PTMC solution with hard sphere ratio . . . . .	184
A.8 Orientation relationships . . . . .	186
<b>B Supplements to <i>Intricate morphologies of laths and blocks in low-carbon martensitic steels</i></b>	<b>189</b>
<b>C Supplements to <i>On the chevron morphology of surface martensite</i></b>	<b>199</b>
C.1 Additional maps . . . . .	199
C.2 Crystallographic features . . . . .	202
C.3 Variant selection predictions and predictions of the favoured austenite orientations based on the PTMC . . . . .	204
<b>D Variants table</b>	<b>209</b>
D.1 Grouping of variants . . . . .	211
<b>Bibliography</b>	<b>220</b>
<b>Curriculum Vitae</b>	<b>221</b>