



# Least-Mean-Square Adaptive Filters

*Simon Haykin  
Bernard Widrow*

*Wiley Series in Adaptive and Learning Systems for Signal Processing,*

*Communication and Control*

*Simon Haykin, Series Editor*

# CONTENTS

<b>Contributors</b>	<b>ix</b>
<b>Introduction: The LMS Filter (Algorithm)</b>	<b>xii</b>
<i>Simon Haykin</i>	
<b>1. On the Efficiency of Adaptive Algorithms</b>	<b>1</b>
<i>Bernard Widrow and Max Kamenetsky</i>	
<b>2. Traveling-Wave Model of Long LMS Filters</b>	<b>35</b>
<i>Hans J. Butterweck</i>	
<b>3. Energy Conservation and the Learning Ability of LMS Adaptive Filters</b>	<b>79</b>
<i>Ali H. Sayed and V. H. Nascimento</i>	
<b>4. On the Robustness of LMS Filters</b>	<b>105</b>
<i>Babak Hassibi</i>	
<b>5. Dimension Analysis for Least-Mean-Square Algorithms</b>	<b>145</b>
<i>Iven M. Y. Mareels, John Homer, and Robert R. Bitmead</i>	
<b>6. Control of LMS-Type Adaptive Filters</b>	<b>175</b>
<i>Eberhard Hänsler and Gerhard Uwe Schmidt</i>	
<b>7. Affine Projection Algorithms</b>	<b>241</b>
<i>Steven L. Gay</i>	
<b>8. Proportionate Adaptation: New Paradigms in Adaptive Filters</b>	<b>293</b>
<i>Zhe Chen, Simon Haykin, and Steven L. Gay</i>	
<b>9. Steady-State Dynamic Weight Behavior in (N)LMS Adaptive Filters</b>	<b>335</b>
<i>A. A. (Louis) Beex and James R. Zeidler</i>	

10. Error Whitening Wiener Filters: Theory and Algorithms <i>Jose C. Principe, Yadunandana N. Rao, and Deniz Erdogmus</i>	445
Index	491