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Ambulatory Impedance Cardiography

The Systems and their Applications

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To my wife EWA and only daughter OLA

Preface

This book gives the reader the necessary physical background of impedance cardiography and currently available systems for hemodynamics holter monitoring. It compares ambulatory impedance cardiography and other clinically accepted methods through an updated state-of-the-art. Besides describing the techniques, it also shows the clinical applications of them. The book is intended for graduate and postgraduate students, researches and practitioners interested in impedance cardiography and/or in ambulatory monitoring of vital signals in human. The monograph summarizes my research on the subject I have been developing for the last 15 years. It is based in a large portion on my habilitation thesis, published in *Polish Journal of Medical Physics and Engineering* (PJMPE, 2005). Hereby, I would like to thank to the Publisher authorities of PJMPE for their kind agreement to use the material from the thesis in this book.

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List of Abbreviations

AC	alternating current
AF	Atrial fibrillation
AVd	atrio-ventricular delay
CO	cardiac output
CRT	cardiac resynchronisation therapy
DC	direct current
$(dz/dt)_{\max}$	maximal amplitude of the first derivative impedance signal
ECG	electrocardiogram
EEG	electroencephalogram
ET (LVET, VET)	ejection time, left ventricular ejection time
EPCI	Ejection Phase Contractility Index.
EMS	Electro-mechanical systole
GSR	galvanic skin resistance
H	height of the subject in (cm)
HR	heart rate
LVH, RVH	left ventricular hypertrophy, right ventricular hypertrophy
LVET (ET, VET)	left ventricular ejection time
L_0	distance between receiving electrodes (cm)
PAT	paroxysmal atrial tachycardia
PCG	phonocardiogram
PEP	Pre-ejection period
ρ	resistivity
SV	stroke volume
VET (LVET, ET)	left ventricular ejection time
VEB	Ventricular extrasystole beat
ΔV	changes of the blood volume of the body segment (cm^3)
VEPT	Volume of Electrically Participating Tissues (a function of patient's gender, height and weight)

ΔZ	changes of the impedance of the segment limited by receiving electrodes (Ω)
Z_0	the base impedance of the segment limited by the receiving electrodes (Ω)