

From the Institute of Medical Physics
Friedrich-Alexander-Universität Erlangen-Nürnberg
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Computed Tomography-based Kymogram Calculation and Detection

Inaugural-Dissertation
zur Erlangung der Doktorwürde
an der Medizinischen Fakultät
der Friedrich-Alexander-Universität
Erlangen-Nürnberg

vorgelegt von

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aus Villingen-Schwenningen

Gedruckt mit Erlaubnis der Medizinischen Fakultät der
Friedrich-Alexander-Universität
Erlangen-Nürnberg

Dekan: Prof. Dr. M. Röllinghoff
Referent: Prof. Dr. W. A. Kalender, Ph. D.
Korreferent: Prof. Dr.-Ing. G. Greiner
Priv.-Doz. Dr. M. Kachelrieß

Tag der mündlichen Prüfung: 29. 03. 2004

Berichte aus dem Institut für Medizinische Physik der Friedrich-
Alexander-Universität Erlangen-Nürnberg

Band 13

Dirk-Alexander Sennst

**Computed Tomography-based
Kymogram Calculation and Detection**

D 29 (Diss. Universität Erlangen-Nürnberg)

Shaker Verlag
Aachen 2004

Bibliographic information published by Die Deutsche Bibliothek

Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data is available in the internet at <http://dnb.ddb.de>.

Zugl.: Erlangen-Nürnberg, Univ., Diss., 2004

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Printed in Germany.

ISBN 3-8322-3059-9

ISSN 1616-0142

Shaker Verlag GmbH • P.O. BOX 101818 • D-52018 Aachen

Phone: 0049/2407/9596-0 • Telefax: 0049/2407/9596-9

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To my wife Rebecca

Preface by the Editor

Imaging of the heart with spiral CT and retrospective phase-selective reconstruction of 2D and 3D images was developed at the IMP in the late nineties. This approach got accepted within short time; meanwhile all CT manufacturers offer product implementations of cardiac spiral CT. In all cases it is required to obtain an electrocardiogram (ECG) simultaneously with the spiral CT scan to allow synchronization of data acquisition and cardiac phase. The additional effort of taking the ECG is accepted as there has not been an established alternative.

The thesis of Dirk-Alexander Sennst investigates an alternative approach to using the ECG. The necessary data regarding the cardiac motion phase can be extracted directly from measured attenuation data. This approach may have the additional advantage that a true motion function gives a more accurate representation of the cardiac motion phase than the surrogate of an electrophysiological recording. In any case the approach appears to provide equivalent image quality to that of ECG-based reconstructions for most patients.

The kymogram approach has also been successfully applied to lung imaging with the positive result of removing motion unsharpness in the pericardial regions.

General acceptance of the kymogram approach will depend on the results of larger clinical studies carried out in different centers. The necessary software has become available in the course of this thesis project. The presented details constitute the necessary basis for such studies.

Willi A. Kalender, Ph.D.
Editor

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