

PHYSICA MEDICA

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Indexed/Abstracted in:

ISI (*Biophysics & Biochemistry Citation Index®*, *Science Citation Index-Expanded®*,
Journal Citation Reports Science®, *Research Alert®*)

Excerpta Medica (*EMBASE*),

INSPEC (*Current Papers in Physics and Physics Abstracts*)

QUEST (a data base dedicated to Health and Medical Physics Journal).

VOL. XVIII, N. 1, 2002, January-March

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Editorial

A dedication to the writers of papers in Physica Medica:

*“My hand is weary with writing
My sharp quill is not steady
My slender-beaked pen juts forth
a black draught of shining dark-blue ink”*

From an “11-th century poem in honour of St. Colum Cille” (ca. 521-597).
His followers wrote the “Book of Kells”, kept at the Trinity College Library, Dublin

As every year in the first issue of a new volume I am trying to illustrate the status of the journal both from the scientific and editorial point of view. Many improvements derive from the discussion held at the biennial editorial board meeting. The sixth meeting was held in Belfast (UK) on September 12, 2001 in conjunction with the VII EFOMP Congress (Fig. 1). Most of the indications and suggestions have already been or will shortly be implemented in the journal management.

The Editorial Situation

In 2001 four regular issues have been published: *Vol. XVII(1), (2), (3) and (4)*. Three issues contain an *Abstract Section*:

– Volume XVII(1) the Abstracts of the “*3rd EFOMP Workshop on New Technologies on Diagnostic Radiology: Advances in Combined Modalities and Image Fusion*”;

– Volume XVII(2) the Abstracts of the “*40th Annual Meeting of the South African Association of Physicists in Medicine and Biology*” and the Abstracts of the “*40th Annual Meeting of the Société Française de Physique Médicale*”;

– Volume XVII(3) the Abstracts of the “*European Congress of Medical Physics and Clinical Engineering*” (VII EFOMP Congress, IPEM Annual Scientific Meeting, APSM Annual Scientific meeting).

This demonstrates the increasing role of Physica Medica as a reference journal for the scientific activities of European Medical Physics organisations. Additionally peer-reviewed papers presented at the 3rd EFOMP Workshop-2001 have been published in the *Conference Papers* Section of Volume XVII(4) issue.

Four Supplements have also been published:

– Volume XVII(Supplement 1): *1st International Workshop on Space Radiation Research and 11th Annual NASA Space Radiation Health Investigators Workshop*, Arona, Italy, May 27-31, 2000.

– Volume XVII(Supplement 2): AIFM Course “*The Practical use of TCP and NTCP models for the evaluation of treatment plans in radiotherapy*”, Como, Italy, October 13-15, 1999

– Volume XVII(Supplement 3): *International Conference on Ocular Pathologies Therapy with Proton Beams*”, October 12-13, 2000

– Volume XVII(Supplement 4): *Tm-MerPE-2000*, Lisbon, November 20-22, 2000).

Sponsorship and Circulation

The following societies have adopted Physica Medica as official journal:

EFOMP (European Federation of Organisations for Medical Physics)

AIFM (Italian Medical Physics Association)

SFPM (French Medical Physics Society)

DGMP (German Medical Physics Society)

NVKF (Dutch Society of Medical Physics)

LMEPS (Latvian Medical Engineering and Physics Society)

SAMPS (South African Medical Physics Society).

Additionally Physica Medica has been approved for recognized Journal status by the European Physical Society, which is valid for a period of five years, from April 1st 2002.

The journal home page (<www.physicamedica.com>) carries not only the indexes of the published issues (since 1996) but also the abstracts of the published papers (since 2000). Additionally Volume XVII (Supplement 1) 2001 is entirely available on-line in pdf format.

The current circulation of the journal has now reached 1000 copies up from 600 copies in 1999. This number



Fig. 1 – Participants at the VII EFOMP Congress at the Parliament Building, Stormont, Belfast (UK) on September 14, 2001 (courtesy of Peter Smith)

includes all members of AIFM (the Italian Association of Physics in Medicine), all members of SFPM (the Société Française de Physique Médicale), research institutions subscribers, individual members subscribers and complimentary copies. A larger number of copies has been printed for the supplements. In particular, the circulation of Volume XVII (Supplement 1) has reached 1400 copies.

Papers turn-around

Table I shows the paper turn-around in the last 12 years and Table II the average turn-around time in the years 1994-2001. There has been a favorable trend in the last years both in paper submission and in turn around time reduction. The average return of the first review from referees to author is now within 2 months and the average acceptance time is now less than 4 months. The actual publication follows within two months. The rejection rate is rather stable around 30%.

Table I – Papers turn-around.

| | Year | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00(*) | 01(*) | Total (*) |
|-------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|--------------|
| Submitted | | 20 | 28 | 17 | 22 | 29 | 26 | 44 | 32 | 26 | 33 | 40 | 31 | (348) |
| Accepted | | 15 | 22 | 13 | 13 | 20 | 21 | 30 | 22 | 16 | 24 | 26 | 15 | (237) |
| Rejected or w/drawn(**) | | 5 | 6 | 4 | 9 | 9 | 5 | 14 | 10 | 10 | 9 | 12 | 3 | (96) |
| Percentage | | 25% | 21% | 24% | 41% | 31% | 19% | 32% | 31% | 38% | 27% | 30% | | (26%) |
| Under revision | | == | == | == | == | == | == | == | == | == | == | 2 | 6 | |
| Still with referees (+) | | == | == | == | == | == | == | == | == | == | == | == | 7 | |

(*) As on December 31, 2001

(**) Papers sent back to author for revision and not received in revised version after twelve months are considered as withdrawn

(+) First evaluation by the referees

Table II – Average turn-around time (in days).

| | Year | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01(*) |
|---|------|-----|-----|-----|-----|-----|-----|-----|-------|
| From First Submission → To Back to author | | 71 | 68 | 55 | 77 | 67 | 64 | 49 | 59 |
| From First Submission → To Acceptance | | 188 | 206 | 170 | 147 | 153 | 128 | 118 | 94 |

(*) As on September 4, 2001

Indexing, Citation Index and Impact Factor

Physica Medica is indexed in the following data bases:

| | |
|--|-------------------------------------|
| <i>EMBASE</i> | (Excerpta Medica) |
| <i>Current papers in Physics</i> | (INSPEC) |
| <i>Physics Abstract</i> | (INSPEC) |
| <i>QUEST</i> | (private company data base) |
| <i>Biophysics & Biochemistry Citation Index®</i> | (ISI) |
| <i>Science Citation Index Expanded®</i> | (ISI) |
| <i>Journal Citation Reports Science®</i> | (ISI) |
| <i>Research Alert®</i> | (ISI) |
| and partially in <i>Index Medicus</i> | (National Library of Medicine, NIH) |

The Journal has the IMPACT FACTOR since 1996 and Figure 2 shows its positive trend in the last 4 years, as obtained from 2000 JCR Science Edition.

From JCR 2000 Science Edition one can also see how many times Physica Medica has been cited by other journals in year 2000 (116). Among these: Physics in Medicine and Biology 17 times, Medical Physics 10 times and Physica Medica itself only 9 times. It is clear that the self-citing procedure is not very high for Physica Medica (9/116, i.e., less than 10%). Physica Medica cited half-life (the age range of 50% of the Journal's cited articles) is 3.6 years, thus indicating that Physica Medica is a rather 'young' journal in the medical physics community at large. Table III summarizes some of the relevant data for Physica Medica.

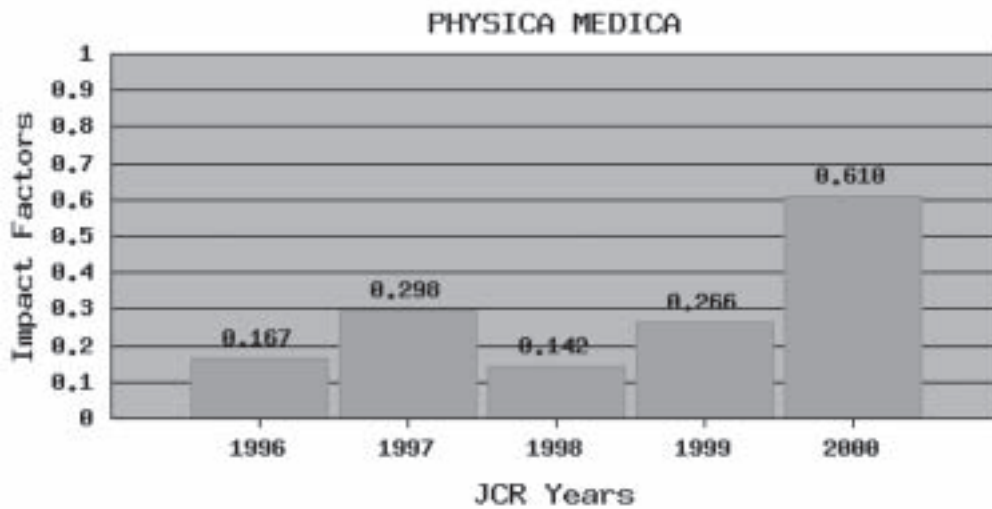


Fig. 2 – Impact Factor Trend Graph of Physica Medica.

Table III – Relevant data for Physica Medica (from JCR 2000 Science Edition).

| | |
|--|----------------|
| Full Journal Title | Physica Medica |
| Official Abbreviated Journal Title | Phys Medica |
| Impact Factor 2000 | 0.610 |
| Subject Category | Biophysics |
| Ranking within the subject category according to Impact Factor | 56 over 66 |
| Total Cites in 2000 | 116 |
| Cited Half-life (years) | 3.6 |

Physica Medica best paper

The Editorial Board of PHYSICA MEDICA has decided in 2000 to assign a prize to the best paper published in the journal. The *Galileo-Galilei Foundation* in Pisa, Italy (Galileo Galilei was born in Pisa) has sponsored this prize that has been called *Galileo-Galilei Award in Medical Physics*. The award will be assigned every second year to the best paper published in the journal in the previous two years. The competition is open to all papers (of the categories that undergo a review process: review papers/original papers/conference papers/technical notes/letters to the editor) published in the regular issues, not including the Supplements. The selection is made by the members of the Editorial Board by a voting procedure. The prize consists in a silver medal (see Figure 3) and a certificate for each of the authors of the winning paper. The winner of the first edition of the *Galileo-Galilei Award in Medical Physics* for the best paper published in the years 1999 and 2000 is:

- *An inverse Monte Carlo optimization algorithm for conformal therapy*
by L. Bogner, J. Scherer and M. Herbst, Physica Medica 1999: XV(3); 111-119



Fig. 3 – The medal for the *Galileo Galilei Award in Medical Physics*: (left) front-side; (right) back-side.

The price has been given on September 12, 2001 on occasion of the VII EFOMP Congress in Belfast, United Kingdom (Fig. 4). Unfortunately due to the tragic event of September 11 the corresponding author of the paper, dr. Bogner, was unable to come and the prize was presented to him and his co-authors in a later scientific meeting by the EFOMP representative in the Editorial Board.



Fig. 4 – The Editor in Chief of Physica Medica showing the medal for the Galileo Galilei Award in Medical Physics at the ‘Gala Dinner’ of the VII EFOMP Congress (Belfast, September 12, 2002).

The next *Galileo-Galilei Award in Medical Physics* will be given at the VIII EFOMP Congress in Eindhoven, The Netherlands, in May 2003, for the best paper published in Physica Medica in the years 2001 and 2002.

Editorial Board Renewal

It has been decided to partially renew the composition of the Editorial Board. Some members have been re-appointed for a three year term period and new members have been offered the position, that they have gratefully accepted. Additional members are still to be indicated by the sponsoring societies. I want to express my gratitude to all members that have completed their term and have worked with competence and enthusiasm toward the firm establishment of Physica Medica as a very valuable journal for the medical physics community.

Yours Truly

Pisa, March 1, 2002

The Editor in Chief
Alberto Del Guerra

Piezoelectric tandem shock wave generation for extracorporeal shock wave lithotripters

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Manuscript received: September 3, 2001; revised: November 12, 2001

Accepted for publication: November 15, 2001

Abstract

The design and performance of a modified piezoelectric shock wave generator, capable of producing two similar shock waves with a time delay between 50 and 950 μsec is described. The objective is to enhance cavitation – induced damage to kidney stones during extracorporeal shock wave lithotripsy in order to reduce treatment time without increasing tissue trauma. Kidney stone model fragmentation efficiency and pressure measurements were obtained at different time delays and compared to that of a conventional single shock wave system. The novel double discharge circuit presented here could be installed in clinical devices, however it should be considered that modifying medical certified equipment might destroy international approvals. Extensive *in vivo* human series will be important to evaluate the new design. The system could also be useful as a research tool to define techniques that minimize tissue trauma while improving treatment efficiency.

KEYWORDS: ESWL, cavitation, piezoelectric shock wave generation, tandem shock waves.

Radiochromic film dosimetry for a 62 MeV clinical proton beam

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Manuscript received: October 25, 2001; revised: January 23, 2002

Accepted for publication: January 28, 2002

Abstract

Radiochromic film (RCF) dosimetry has great potential in the procedures for the quality control of dosimetric computation of multiple beam techniques supplied by treatment planning systems (TPS). In this study the RCF MD-55-2 have been used for 62 MeV clinical proton beam dosimetry at the Clatterbridge Center for Oncology (UK). Irradiations were performed positioning the RCF directly in a water phantom. The films were irradiated both in perpendicularly and in parallel configuration with respect to the proton beam central axis, to study the change of the RCF efficiency with the film orientation.

Due to the change of the RCF efficiency at Bragg peak, the dose underestimation was 8% and 52% for the RCF positioned in perpendicular and parallel configuration with respect to the central beam axis, respectively. For a modulated proton beam the dose underestimation was 8% and 60% for perpendicular and parallel irradiated film, respectively, at the end of the SOBP (spread-out Bragg peak) region. For RCF irradiated with a modulated proton beam in parallel configuration, a correction factor $k_{E_0}^{\text{RCF}}$, that is a function of the beam residual range and is specific for a proton beam of incident effective energy, E_0 . The procedure has been automatized by a dedicated software and could be useful for the dosimetric verification of the TPS computation, and accurate dosimetric characterization of small proton beams.

KEYWORDS: Radiochromic Film, Dosimetry, Proton therapy.

Calculation of the Modulation Transfer Function from the Square Wave Response Function data with an interactive curve fitting software

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Manuscript received: May 19, 1999; revised September 27, 2001

Accepted for publication: December 31, 2001

Abstract

Two ways to calculate the modulation transfer function (MTF) of radiographic screen-film systems from the measured square wave response function (SWRF) data were investigated with an interactive curve fitting software. The measured SWRF data obtained by digitising a radiographic image of a bar pattern test object were fitted to a curve, and the fitted curve was used to calculate the MTF. Satisfactory MTF was obtained by using 12 terms in the calculation. A second version of the calculation included a correction for the normalization at 0.25 cycles/mm of the SWRF data. Measurements from a screen-film combination showed that the MTF of the first version was higher than the second by an average amount of 0.02 units for spatial range 0-3.5 cycles/mm, and on average the MTF of the first version was higher than the second by 10%. Both the SWRF data fitting and the MTF calculation were done within an interactive curve fitting software which made the calculation relatively easy to perform.

KEYWORDS: Medical radiography, modulation transfer function, screen-film system, square wave response function.