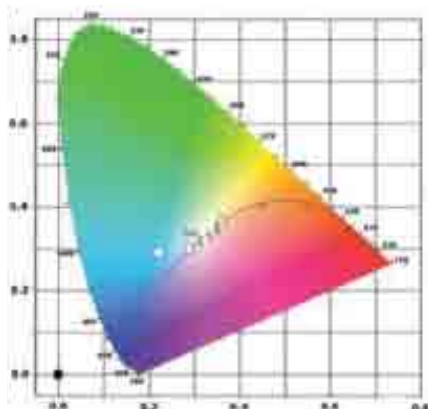


zirconia based phosphors

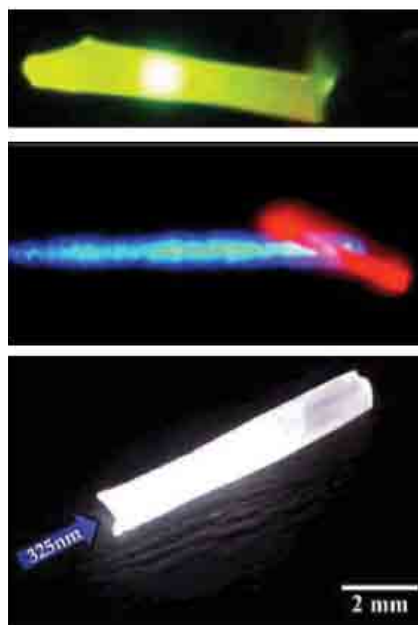
rosa soares,
cláudio nico, joana
rodrigues, nuno
ferreira, marco
peres, luís rino,
jorge soares,
antónio fernandes,
florinda costa,
teresa monteiro

department of physics & I3N,
university of aveiro



Nowadays, huge efforts are being put in technologies which promote energy savings namely in the solid state lighting (SSL) area from which economic benefits are expected. Such advances require key science challenges, including the development of innovative functional materials, new device design and progresses on light extraction. GaN-based wide band-gap semiconductors are among the most used LED-based light sources. However, the low efficiency and droop of the green component of such LEDs limits the performance of red-green-blue (RGB) based SSL systems, especially when white light sources are envisaged. A promising alternative approach to the production of white light for replacement of conventional light sources is phosphor converted white emission by a photoluminescence mechanism. These devices operate by pumping yellow phosphors (YAG:Ce³⁺) with blue GaN

- based LEDs. In order to enhance the color rendering index (CRI), new phosphor materials must be exploited. In this framework, due to their outstanding optical, chemical and mechanical properties, zirconia-based hosts appear as major candidates for replacing YAG:Ce³⁺. Zirconia exhibits a wide band gap and allows the incorporation of active lanthanide dopants. Our results demonstrate that red, green and white emission can be obtained by optically pumping Tb³⁺, Eu³⁺ (or Pr³⁺) and Dy³⁺ doped zirconia, respectively. These phosphors were obtained by two different routes, namely the laser floating zone (LFZ) for monocrystalline fibres and self-combustion for nanometric powders. Both approaches resulted in room temperature bright visible light emission, as can be seen in the images. The white emission obtained in ZrO₂:Dy³⁺ is highlighted due to its technological importance.



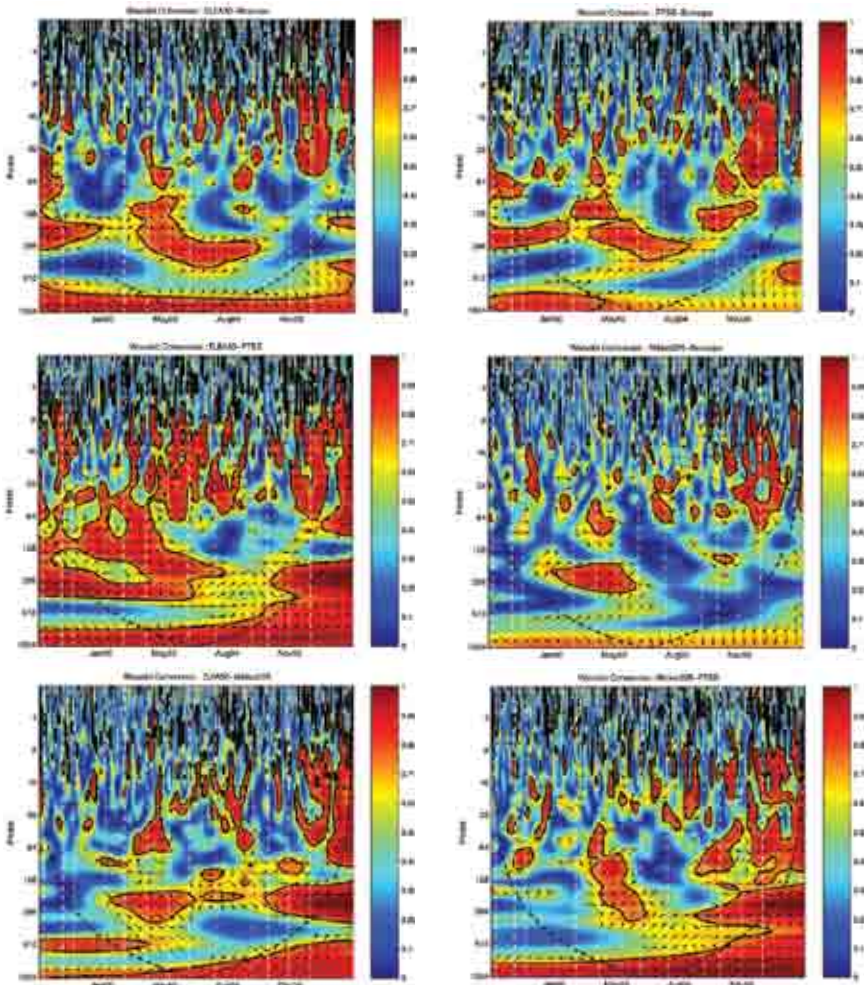
international stock market indices comovements: a new look

mara madaleno,
carlos pinho

department of economics,
management and industrial
engineering & GOVCOPP,
university of aveiro

It is of considerable interest to investors and financial market regulators to examine how vulnerable stock markets are to different financial shocks. We provide additional evidence on breaks in linkages between crisis capital markets. The usefulness of wavelet analysis to financial contagion and comovement is illustrated, considering that international investors distinguish between short and long run relations. Continuous wavelet and cross-wavelet analysis have the ability to analyze transient dynamics for single time series, or for their association, allowing, thus, for a multivariate (bivariate) analysis.

This study accounts for the time-varying pattern of price shock transmission, exploring stock market linkages using continuous time wavelet methodology. In order to sustain and improve previous results regarding correlation analysis between stock market indices, namely FTSE100, DJIA30, Nikkei225 and Bovespa, we extend here such analysis using the Coherence Morlet Wavelet. Results indicate that the relation among indices was strong but not homogeneous across scales, that local phenomenon's are more felt than others in these markets and that there seems to be no quick transmission through markets around the world, but yes a significant time delay. Innovations in the US and UK stock markets are not rapidly transmitted to other markets, which may induce arbitrage opportunities. Moreover, business cycle periods, corresponding to historical financial crisis periods, were identified, where the series show higher coherence, but mostly at low frequencies, favouring the contagion hypothesis during



these periods. Also, geographically and economically closer countries exhibit higher levels of market linkages, as suggested by previous authors, and the Japanese market, in general, presents a low comovement with the other countries considered. Finally, the importance of historical transmissions has decreased in the last decade, with the exception given for the period 2007–2009.

sampling in engineering and mathematics

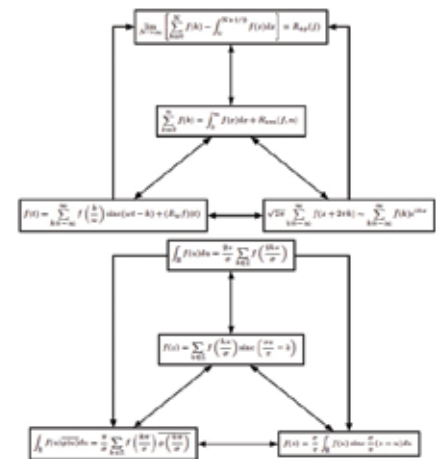
paulo jorge ferreira¹, saburo saitoh², paul butzer, rolf stens, gerhard schmeisser, rowland higgins, maurice dodson

¹ department of electronics, telecommunications and informatics & IEETA, university of aveiro

² department of mathematics & CIDMA, university of aveiro

In 1900, David Hilbert put forth a collection of problems that he believed could shape the course of mathematics in the twentieth century. In his famous address to the International Congress of Mathematicians of 1900 he mentioned ten of those problems. The expanded version of his speech, published soon after the congress, contained 23 problems. Hilbert’s notebook mentioned yet another one, related to the question of “simplicity of a theorem” and the role of “equivalences”:
 “Criteria of simplicity, or proof of the greatest simplicity of certain proofs. Develop a theory

of the method of proof in mathematics in general. Under a given set of conditions there can be but one simplest proof. Quite generally, if there are two proofs for a theorem, you must keep going until you have derived each from the other, or until it becomes quite evident what variant conditions (and aids) have been used in the two proofs. Given two routes, it is not right to take either of these two or to look for a third; it is necessary to investigate the area lying between the two routes...”
 Part of the interest in equivalence groupings is due to the information that they reveal about the area lying between the equivalent propositions. At IEETA, a team of senior researchers from 5 countries, partially supported by the FCT, has been investigating sampling (AMS subject classification 94A20), interpolation and Fourier analysis. The goal is to clarify the connection between these topics, which are of interest to both mathematicians and engineers, and lie at the heart of mathematical analysis. Simultaneously, the team has uncovered new results in the history of the subject. The results (more than 180 pages in 2011) have been published in mathematical and engineering journals, including The Journal of Fourier Analysis and Applications and Notices of the AMS, the most widely read journal in mathematics, contributing a great deal to the visibility of the e_or.



1 department of electronics, telecommunications and informatics & IEETA, university of aveiro
 2 department of mathematics & CIDMA, university of aveiro