

basicamente três etapas: gravação da estrutura matriz, confecção de um molde metálico e a obtenção das réplicas por técnicas apropriadas que podem ser injeção, prensagem ou moldagem. Em nosso caso, estruturas (matrizes) com períodos entre 0,5mm e 1,6mm são gravadas em relevo utilizando a projeção de padrões de luz holográficos em filmes de fotorresina depositada sobre vidro. As matrizes são metalizadas e utilizadas como cátodos num sistema eletro-químico de deposição de níquel metálico. Nesta etapa, cerca de 300mm de níquel é eletroformado gerando o molde que possui um relevo complementar ao da matriz. A partir deste molde, as réplicas são obtidas via injeção de plástico. Estas duas últimas etapas requerem equipamentos dedicados e foram realizadas em parceria com a indústria fonográfica Sonopress/SP. Como resultado obtivemos um disco (nos mesmos formatos do CD) contendo estruturas com diferentes períodos e alturas. As estruturas replicadas foram caracterizadas por AFM e através da medida de seus espectros de difração para diferentes polarizações da luz incidente. Para avaliar os limites de resolução do processo de injeção, as propriedades das réplicas foram comparadas com as respectivas matrizes e moldes metálicos.

[07/05/04 - 10:30h - Sala OTI - Palace Hotel]

BACK PROJECTION TOMOGRAPHY BY THE SIMULTANEOUS EQUATIONS TECHNIQUE, ANTON SKYRDA VERÍSSIMO, SANDRO FONSECA QUIRINO, RENATA PARREIRA KRULL, ENIZETE APARECIDA GONÇALVES, ALBERTO MONTEIRO DOS SANTOS, ANTONIO OSNY DE TOLEDO, IEAv - CTA - São José dos Campos - SP • The computerized tomography is a reconstruction technique from projections that can be used to know physical and chemical distribution properties in solid bodies, gas and liquid masses, plasmas, flames, and so on. Tomography by absorption and emission of light can be used in the field of combustion. In the absorption tomography a laser beam, with a resonant wavelength, cross the media where it is absorbed. In the emission tomography, the light emitted by the media is scanned by a detector. The method of simultaneous equations is used either by absorption or emission tomography and is a kind of Algebraic Reconstruction Technique. We present the process of ray tracing and the numerical approach of reconstruction of this simple technique. The ray tracing technique gives us the rules for mounting a set with a great number of simultaneous algebraic equations that do not have a unique solution because the equations are not all independent. From this set of non independent equation we choose a set of independent one that will produce the wished solution. For a great number of data this technique is time consuming, but we are dealing with few data tomography (less than 10^4 per slice). An example performed in MathCad illustrates this work.

[07/05/04 - 10:45h - Sala OTI - Palace Hotel]

Light propagation in chiral and magnetochiral random media: the impact of broken symmetries, F.A. PINHEIRO, Centro Brasileiro de Pesquisas Físicas - CBPF/CNPq, Rio de Janeiro, Brazil, B.A. VAN TIGGELEN, Laboratoire de Physique et Modélisation des Milieux Condensés, CNRS, Grenoble, France • In the present contribution, we investigate light transport and scattering in random

media with broken mirror and/or time-reversal symmetries. Using microscopic transport theory, we calculate the optical transmission coefficient for a slab containing disordered chiral particles, associated with broken mirror symmetry. We demonstrate the residual circular polarization of diffuse light in chiral optical media, in contrast to achiral systems where the light emerges completely depolarized due to multiple scattering. We introduce a model to describe light scattering in inhomogeneous magnetochiral media, which occurs for broken mirror and time-reversal symmetries. Within this model, magnetochirality is generated by considering light scattering by magneto-optical particles subject to an external magnetic field and distributed in chiral configurations. In such media, we define a new optical measure for the degree of chirality and calculate it for some simple chiral systems and even use it to probe the chirality of random media. Finally, we compare it with other recently defined chiral measures in literature.

[07/05/04 - 11:00h - Sala OTI - Palace Hotel]

DEVELOPMENT OF A TWO-DIMENSIONAL LIGHT IMAGING FOR BURNED AND HEALTHY SKIN, DANIELA DE FÁTIMA TEIXEIRA DA SILVA, WALTER MIYAKAWA, DENISE MARIA ZEZELL, MARTHA SIMÕES RIBEIRO, Center for Lasers and Applications, IPEN-CNEN/SP • **Background and Objective** : Much effort has been made in the study of light propagation in biological tissues due to the development and wide use of lasers for surgical and therapeutic applications. In particular, for low-intensity laser therapy, the effectiveness is greatly influenced by light distribution in the irradiated tissue. Once known, the understanding of several effects of light tissue interaction and the optimization of this therapy can be achieved. The aim of this work was to determine the relative attenuation coefficient for the light intensity in health and burned skin using a two-dimensional light imaging technique for burned and health skin. **Study Design/Materials and Methods** : One burn lesion of about 6 mm in diameter was created on the back, at the end of the spinal column of male adult rats using a cylindrical brass rod cooled at 77 K. A health skin area was also analyzed. After sacrifice, the areas from healthy and burned skin were collected and placed between two microscope slide mounts. A He-Ne laser beam at $\lambda = 632.8$ nm irradiated the sandwiched tissue, from the epidermis to dermis. A CCD camera was placed orthogonal to the beam path and photographed the intensity distribution of the scattered light. Two lenses were placed between the objective and the microscope slides to enhance the camera's magnification, resulting 10x increase. Along the laser propagation direction it was possible to plot the logarithm of I/I_0 versus the distance, where I_0 is the maximum intensity of light measured when it reached the first pixel of tissue. The exponential decay was fitted to the equation $I(z) = I_0 e^{-\alpha z}$, where $\alpha (mm^{-1})$ is the relative light attenuation coefficient. Averages and standard deviations of α in skin sections were evaluated and analyzed by using the t-Student test. Significance was accepted at $p < 0.01$. **Results** : In burned skin samples, decay was faster than in healthy skin. **Conclusion** : The technique developed was efficient to characterize the light intensity decay and burned and healthy skin can be differentiated by their relative attenuation coefficients. These data can therefore, be used to optimize low-intensity laser therapy.