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Products and Thresholds of Deformed Space-Time-Reactions in Iron

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In this article I summarize the main results of a series of ultrasound applications to iron and steel bars and provide the physical thresholds required to trigger deformed space-time (DST) reactions. These ultrasonic applications determined the emission of neutron bursts, no γ-ray emission and the appearance of external macroscopic damages with elements foreign to the iron bars (e.g., K, Cl and Cu) which are associated with $^{63}Cu/^{65}Cu$ ratios (0.3–1.7) lower than that expected from nature (i.e., 2.2). Deformed microcavities ($\leq$10 μm in size) partially filled with a material characterized by a sub-microscopic chaotic assemblage are found in the interior of an iron bar. It is suggested that these new type of nuclear reactions occurs when the collapse under the ultrasonic pressure waves of micron-sized discontinuities internal to the materials (micropores in the solids and bubbles in the liquids) results in an energy density to time ratio large enough to overcome the threshold predicted by the DST theory.

KEYWORDS: Ultrasounds, Damage, Micropore, Iron, Deformed Space-Time, Piezonuclear.

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1. INTRODUCTION

Recently, ultrasound applications to aqueous solutions[1–3] and solid crystalline materials[4] were performed to verify a theory of the new millennium predicting the local space-time deformation[5,6] and the occurrence of piezonuclear reactions (nuclear reactions induced by pressure), also called DST-reactions.[7,8]

In particular, the application of longitudinal ultrasonic waves to cylindrical bars of steel and alpha-iron (ferrite) resulted in phenomena such as: (i) the emission of neutron bursts,[4] (ii) the change of the natural isotopic ratio of Cu in the bars,[9] (iii) the appearance of several macroscopic damages on the bar surfaces composed of a material with elements foreign to the bars[10] and (iv) the occurrence of zones with a high density of deformed microcavities in the bar interiors filled with a sub-miscroscopic chaotic material.[11] As far it is known these phenomena cannot be explained using traditional theoretical principles. It was thus suggested that the damage on the surfaces of the steel and ferrite bars is the result of local DST-reactions triggered by the sudden collapse of inter-crystalline cavities under the influence of extremely high local pressure determined by the ultrasound treatment.[4,9–11]

In this article I summarize the main results of these ultrasonic experiments and provide the physical thresholds required to trigger DST-reactions in accordance with the theory predicting the deformation of the local space-time and the violation of the Local Lorentz Invariance.[5,6]

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2. EXPERIMENTAL SETUP

This section summarizes the characteristics of the ultrasonic machine (R-1-S reactor) used to treat all the steel and iron bars and briefly describes the setup of the ultrasound treatment.[4]

The R-1-S reactor was designed by Startec Ltd with the specific goal of treating cylindrical metal bars. It has a converter unit with piezoelectric ceramics connected to a truncated conical sonotrode. A metallic frame holds the converter-sonotrode unit aligned with the cylindrical iron bar to be treated (Fig. 1). The primary differences between the R-1-S reactor and the machine used to treat liquids[1,2] are a truncated conical reflector and the shape of the bar tips.[4] This setting allows the application of two trains of longitudinal ultrasonic waves of opposite direction parallel to the axis of the cylindrical bars resulting in transverse compression of the bar. See Figure 1 for a lateral section of the machine setup. Additional characteristics of the R-1-S reactor can not be disclosed as a patent is pending.[12] All the experiments were performed with a sonotrode vibration amplitude of 15 μm, a power of 19 W and a frequency of 20 KHz. All the steel and iron bars were 20 cm-long cylinders with a diameter of 2 cm and were located in an empty dielectric cylinder during the ultrasonic experiments.