Experimental observation of giant amplification knotted electromagnetic waves in various media

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This article presents the results of experimental studies on excitation, propagation and reception of knotted electromagnetic waves in the air, sea water and plasma. The anomalously low attenuation and even amplification knotted electromagnetic waves in the medium was found.

In describes the new topologically non-trivial solutions of Maxwell's equations in vacuum[1, 2], based on the method of Hopf bundles of physical space fields. The work by D.H. Werner and D.M. Jones describes the theoretical calculation directivity patterns knotted antennas that emit knotted electromagnetic waves (EMW)[3]. Detailed experimental data on electromagnetic waves knotted given in work of M.V.Smelov[4].

Fig. 1a, 1b, 1c-d show a photo of the experimental knotted antennas in the form of a trefoil, pentfoil and fifteenfoil respectively with the central half-wave vibrator, exciting knotted EMW.
In this wave the knotted longitudinal component (in the direction of the central axis of the torus, which is the basis for the winding of multyfoil antennas) has an anomalously weak attenuation in a vacuum due to the concentration of the field lines near the axis of the torus. As a result this wave attenuates at the communication distance R between the transmitting and receiving antennas more slowly than for the classical half-wave vibrator (like E ~ 1 / R), the degree of attenuation of the electric field E of the order of $E \sim 1 / R^{(\pi / N)}$, where N - number of the foils of multyfoil (Fig. 1e) at the resonant frequency of the antenna of the order of 2.3 GHz. Comparative analysis of the attenuation of the signal, these four types of antennas shown in the graph on the Fig.1e. The Figure 1e shows graphs of the rate of knotted EMW attenuation with twice increasing communication distance (one octave) in transceier system in an anechoic chamber (Fig. 2a) with background suppression level -100 dB. The level of receiving the measured power at 25 dB above the noise level. The dotted line shows the theoretical change of attenuation with increasing communication distance. The graphs show that the rate of increase of attenuation of the classic half-wave vibrator under double increase of the communication distance is 6 dB per octave, in case of trefoil antenna - 5 dB per octave, for - pentfoil - 3 dB per octave, and for - fifteen loops antenna -less 1.5 dB per octave. Thus, in the experiment found the possibility of excitation of knotted electromagnetic waves in a vacuum with weak damping compared to

Fig. 2 The experimental radio complexes of transceiver knotted antennae of the electromagnetic wave: trefoils in an anechoic chamber (a); two hermetic boxes with antennas of the minipool with sea water (b); antenna matching trefoil in the dielectric water in a hermetic box (s); placement of hermetic box in seawater the minipool (d) conventional transverse waves using knotted multyfoil antennas. This attenuation decreases with increasing number of foils of multifoils antenna and number of foils of knotted waves in the form of a topological braids as a consequence. This effect can be used for remote space communications and radar systems, systems of transportation of microwave energy in a narrow beam. The structure of the knotted electromagnetic field of the trefoil is shown in Fig. 3a, where the white toric tube corresponds to the electric field lines of the knotted field and the black toric tube corresponds knotted magnetic lines of knotted force, orthogonally intersecting the electric field lines according to Maxwell's equations.

The study found amplification of knotted electromagnetic wave in sea water with electrical conduction about 1S/m in transceiver system in acrylic minipool (Figure 2b) $80x90x160cm^3$ in size at various communication distances in one transparency window of knotted EMW at a frequency of 76.8 MHz in the band 8 MHz. For attenuation measurements the trefoil antenna immersed in acrylic hermetic box with distilled water with a dielectric constant $\varepsilon = 80$ (Fig. 2c). Photo immersed antenna is shown in Fig. 2d. The result of the measurement signal attenuation at doubling of communication distance is shown in Fig. 3a, where the red line corresponds to the greater communication distance of 440 mm, the blue line at 220 mm communication distance. Thus it is shown the amplification of knotted electromagnetic wave by 4 ÷ 5 dB with twice (one octave) increasing of communication distance in seawater at transparency windows 43.6 MHz, 76.8 MHz (other windows transparent -16 MHz, 124 8 MHz, 178.8 MHz). The signal amplification in the electron-ion cord in a narrow beam is detected for knotted longitudinal component of EMW. The transverse electromagnetic wave is attenuated in conductive water exponentially to 30 dB at used in present work data communication distances. This amplification effect can be used for submarine, underground radio communication and radar systems.

The article presents the results of an experimental study on the excitation of a spherical plasma MW-discharge at atmospheric pressure without any external additional factor for ignition microwave discharge. Theoretical calculation of the stabilizing effect of a magnetic field on a knotted spherical plasma MW-discharge type of ball lightning given in work by Ranada A.F. et al.[5]. The measuring system represents the generator for a magnetron type 2M229K 1000 W at a frequency of 2.45 GHz microwave output is electrically connected through a matching device with knotted fifteenfoil antenna as shown in the picture Fig. 3c. The photo of the induced sustained spherical plasma MW-discharge (plasmoid) over fifteenfoil antenna under normal atmospheric conditions and without preliminary ignition shown in Fig. 3d, white spherical plasma discharge is visible on top of the antenna under the accelerator ring, below burning hot ceramic microwave output of the magnetron lights red. The temperature of a plasmoid 2000K. The measured energy conversion efficiency in the electron plasma magnetron (the amplification factor of the electronic knotted waves of the magnetron knotted antenna) is equal 20 dB.

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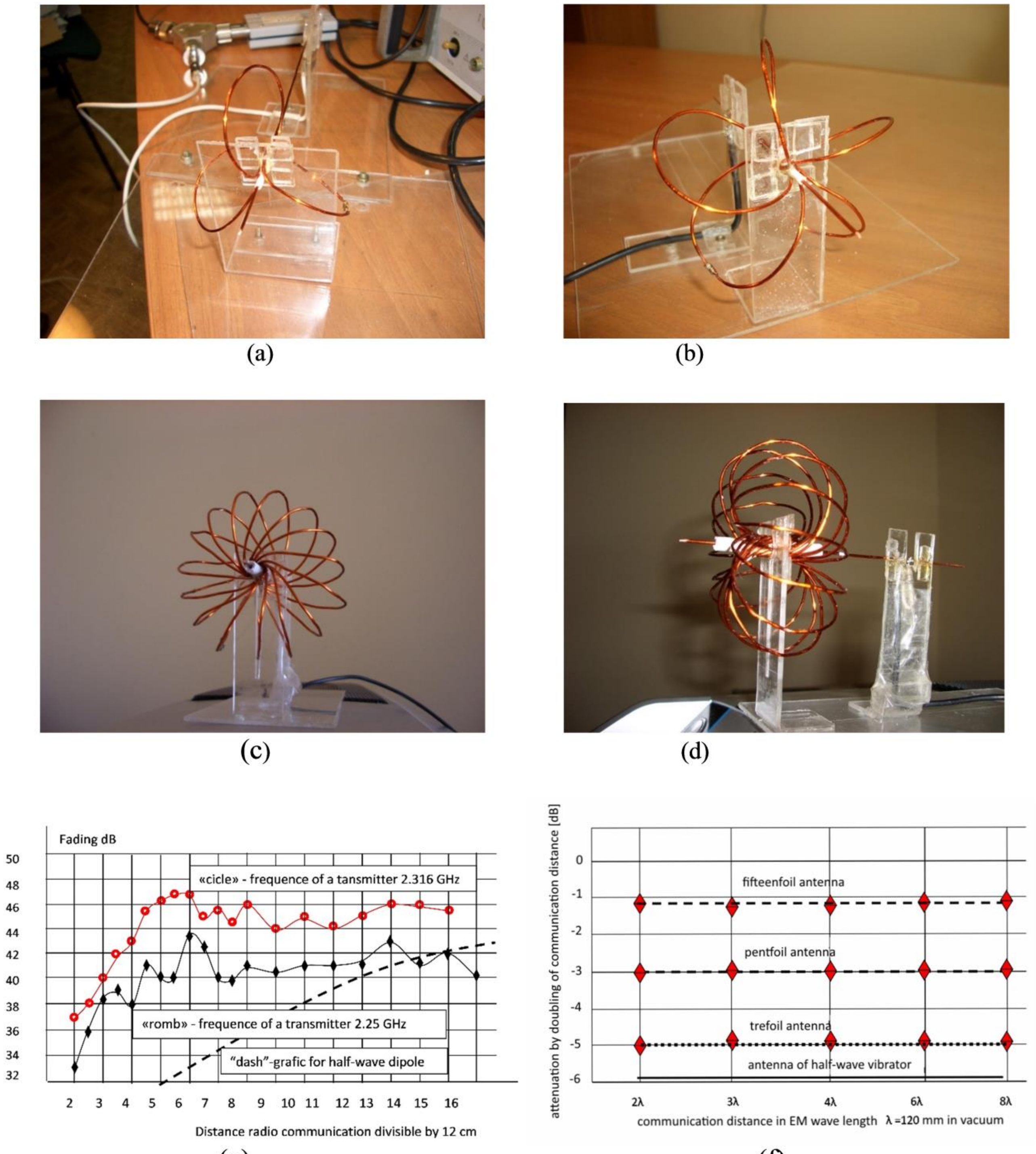
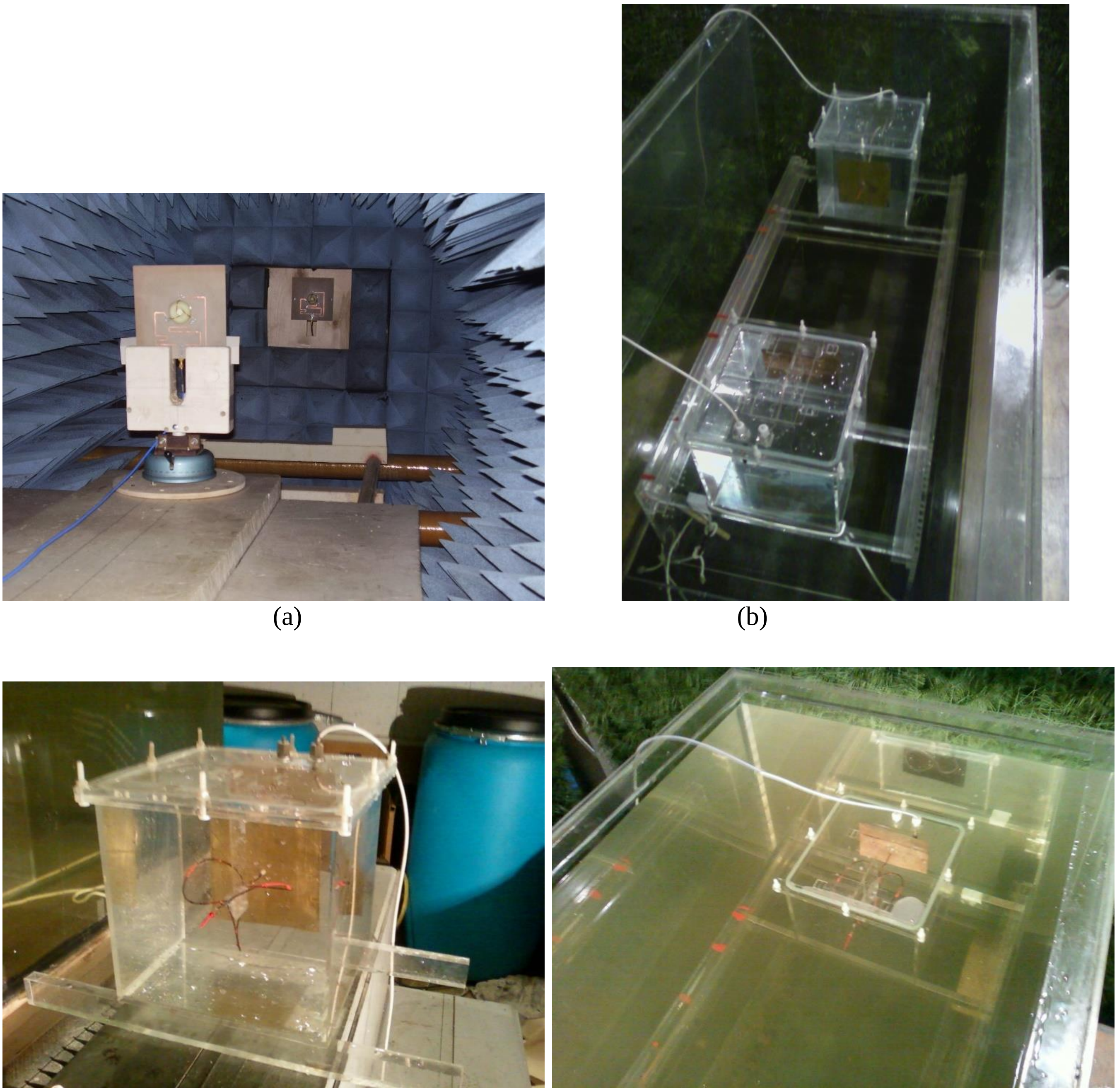


Fig. 1 The antennae emitted the knotted electromagnetic waves: in the form of trefoil with the central half-wave vibrator (a); - pentfoil (b); fifteenfoil – top view (c); - fifteenfoil – view (d); a graph attenuation of PhAR of 4 elements in the form fifteenfoil (e); comparative graphs of attenuation of trefoil, pentfoil, fifteenfoil and a half-wave vibrator (f)



(a) (b)

(c) (d)

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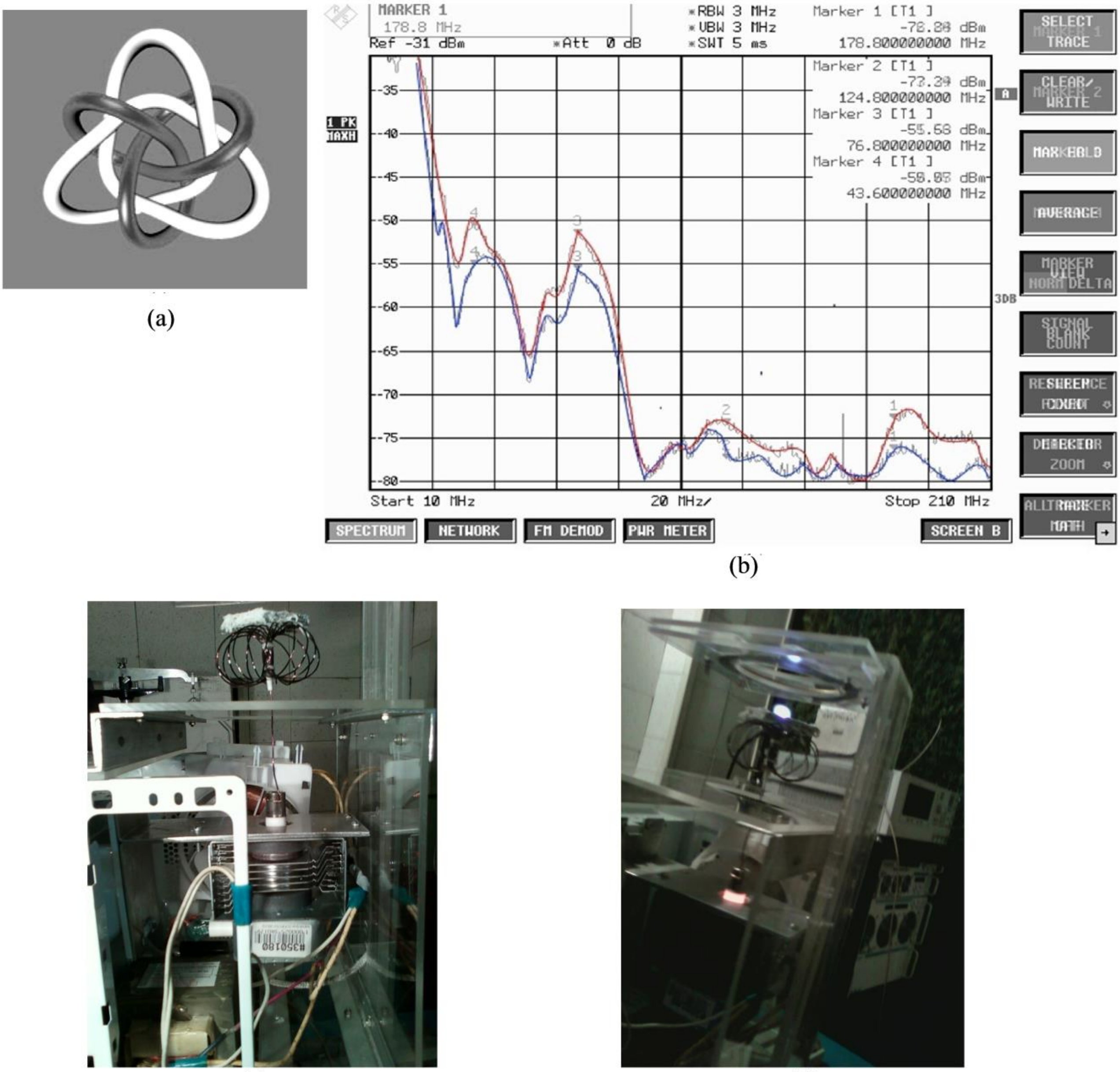

(a) (b) (c) (d)

Fig. 3 The structure of the knotted electromagnetic field of a trefoil antenna where white toric tube corresponds to the electric field lines of knotted electromagnetic force and black tube - the magnetic field lines (a); a graph of amplification of knotted electromagnetic wave by 5 dB with twice increasing distance communication (one octave) in seawater at transparency windows 43.6 MHz, 76.8 MHz (other windows transparent -16 MHz, 124.8 MHz, 178.8 MHz) (b); Photo of magnetron power generator 1kW, at a frequency of 2.45 GHz and an antenna radiating knotted fifteenfoil (c); Photo of the induced sustained plasma discharge over the fifteenfoil antenna under normal atmospheric conditions and without preliminary ignition (d)