Chapter

Deep Saturation Nonlinearity of 5G Media and Potential Link to Covid-19

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Abstract

5G broadband millimeter LFs (low frequencies) are filtered and do not influence into the cells, but in the nonlinear media, the modulation instability of the fast underlying carrier wave leads to appear the slowly varying perturbation parasite envelopes (noises) which is described by nonlinear Schrodinger equation (NLSE). Thus, the 5G pump waves in nonlinearity leads to extremely low frequency electromagnetic pulse envelopes enable to pass the filters such as the skin, and disintegrating in the cells to the 5G carrier waves and disordering genome as a probable origin to organize the corona virus via covering separated part of the genome with the capsids. A so called physical solution on the modulation instability of the nonlinear media is the Kuznetsov-Ma breather revealed previously in the optical fibers and accordingly we have detected here the signature of the Kuznetsov-Ma breather self-similar solution of the NLSE on the global distribution pattern of the covid-19 infection and death cases as an agreement between the theoretical results and observations for covid-19. A possible potential link between the covid-19 and 5G nonlinear internet media is revealed, verifying that the covid-19 global patterns of the infection and death cases are statistically significant.

Keywords: Nonlinear optics, Radiation health risk, Epidemiology, LF radiobiology, covid-19, 5G

1. Introduction

5G internet media uses millimeter waves (10–300 GHZ) in which are easily blocked environmentally and not travel far. Despite previous generations of wireless media, the 5G multiple antennas arrange in "phased arrays" [1, 2] that work together to emit focused, steerable, laser-like beams that track each other causes to appear nonlinear dispersive media, environmentally revealing modulation instabilities due to nonlinearity which is observable in the optical fibers e.g. [3–5] (there are many papers to cite here).

In the linearity, the plane wave is ever stable and perturbations do not grow whereas that in the nonlinearity, the perturbation in the background plane wave is expanded and can produce high amplitude perturbation parasites (noises) via the modulation instabilities which yields to its relevant wave solutions.

Bill P. Curry in his so-called graph reported exponential Microwave absorption in brain tissue, newly confirmed more in the paper "Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz" [6]. However the 5G waves are affecting the cells in the long-term exposure e.g. [7–14] (the articles published in the field of the cells at the exposure of the LF EMF is out of capacity all to cite here) and also bioeffects at exposure of modulated EMF (MEMF) of radiofrequencies of low intensity e.g. [15] and reference in, it is yet correct that the 5G waves are blocked by skin and rarely influence in the bodies is for radio entropy. Then it has been thought that "The 5G Health Hazard That Isn't" as titled in the New York Times. It is real also the radio waves become safer at higher frequencies for that easier to block environmentally and also by skin. But according to the reports, the cells exposed to extremely low frequencies (ELFs) presented an increase of the number of cells with high damaged DNA as compared with non-exposed cells. Then if the 5G media was linear, the 5G electromagnetic waves were almost safe for healthiness of the species in the earth, but since the 5G media is nonlinear then for modulation instability of the nonlinear media, the 5G wireless internet produces extremely low frequency perturbation parasite pulses similar to the perturbation pulses produced in the fiber optics.

Some properties of nonlinearity are appeared in nonlinear media such as self-focusing [16, 17] and wave steepening [18]. The nonlinear dispersive media is described by the nonlinear Schrodinger equation (NLSE) discussed in many papers and the books e.g. [19] as observed in the deep-water wave propagation [20, 21] and optical fiber [22, 23].

NLSE is a central model of nonlinear science, applying to hydrodynamics, plasma physics, molecular biology and optics. NLSE describes the slowly varying envelope that modulates a fast underlying carrier wave. The perturbation method on the NLSE yields to the wave-packet envelopes as the parasite for 5G low frequency carrier waves, enable to cross the skin and expose the cells in the field of extremely low frequencies (ELFs). Thus, the 5G background pump waves can inter noticeable to the cells and damaging DNA and producing some disorders may be relevant to the corona virus which is a part of genome covered by the capsids (capsidal DNA). If this is true it should be an identity between the distribution patterns of the corona virus infection and death cases and wave pattern of the 5G perturbation parasite envelopes.

Wonderfully we detect here the identity between the covid-19 distribution pattern of the infection and death cases and the Kuznetsov-Ma breather self-similar solution of the nonlinear Schrodinger equation (NLSE) which describes the instability of the radio frequency waves in dispersive nonlinear media.

2. 5G and nonlinear Schrodinger equation and covid-19

2.1 Theoretical frameworks

The envelope evolution of nonlinear systems is extracted in the form of nonlinear Schrodinger equation (NLSE) from different methods such as Fourier-Mode coupling e.g. [24], or Multiple-Scale analysis [25]. The NLS equation in nonlinear optics was first derived by Kelley in 1965 using a nonlinear electromagnetic wave Maxwell's equation introduced by Chiao et al. one year earlier [26, 27]. Furthermore, Karpman and Krushkal in 1969 derived the NLS equation using Whitham-Lighthill adiabatic approximation [28].

Consider a system described by the normalized nonlinear Schrodinger equation [(1 + 1)D NLSE]:

$$i\frac{\partial\varphi}{\partial t}+\frac{1}{2}\frac{\partial^2\varphi}{\partial x^2}+f\left(|\varphi|^2\right)\varphi=0 \tag{1}$$

Eq. (1) describes many physical systems, primarily those in which nonlinear waves propagate in isotropic media [29]. The parameter φ describes the slowly varying envelope which modulates a fast underlying carrier wave and the nonlinear term $f\left(|\varphi|^2\right)$ is specific to the physical system.

On the (1 + 1)D NLSE, two particular forms of nonlinearity are Kerr-type and saturable type that are common in optics [30]. The Kerr-type, where $f\left(|\varphi|^2\right) = |\varphi|^2$ and the saturable type, where $f\left(|\varphi|^2\right) = |\varphi|^2/\left(1+|\varphi|^2\right)$.

Of course where $|\varphi|^2/\left(1+|\varphi|^2\right) \approx 1 - \left(1/|\varphi|^2\right)$, the nonlinearity is called the "deep saturation nonlinearity" [31] and most of the interesting properties and energy of the solitons is in the regions where $|\varphi|^2 > > 1$ [31].

If $\varphi(\xi, \tau)$ is a solution of the (1 + 1)D NLSE in deep saturation nonlinearity, then a whole family of the solutions is obtained [31] by re-scaling via real parameter ε as

$$\varphi(\xi, \tau) \rightarrow e^{it\left(1-\varepsilon^2\right)}\varepsilon^{-1}\varphi\left(\varepsilon\xi, \varepsilon^2\tau\right) \tag{2}$$

Then all solutions of the same order of (1 + 1)D deep saturable NLSE are related each other by rescaling and the solutions are self-similar to one another in their physical properties, such as intensity, shape, etc. "This is because the natural scale in the saturable NLSE is visible only in the margins of the intensity profile of the soliton, and its effect on the shape is tiny" [31].

On the Nonlinear Schrodinger equation, the modulation instability of the background plane wave motivates to create localized breathers [32]. Of course there are various types of the numerical and analytical solutions describing breathers relevant to the definition of the nonlinear term $f\left(|\varphi|^2\right)$, but qualitatively breathers can be modeled in a specific solution [33, 34] as the localized pulses on the continuum background plane wave that:

$$\varphi = \left[\frac{2(1-2a)\cosh\left(\sqrt{8a(1-2a)}\tau\right) + i\sqrt{8a(1-2a)}\sinh\left(\sqrt{8a(1-2a)}\tau\right)}{\sqrt{2a}\cos\left(2\sqrt{1-2a}\xi\right) - \cosh\left(\sqrt{8a(1-2a)}\tau\right)}\right] \tag{3}$$

Where a < 1/2, the solution is Akhmediev breather and for a = 1/2 the solution is peregrine soliton and for a > 1/2 it is Kuznetsov-Ma breather. Of course amplitude of the background wave has been deleted here for reality that the background plane wave is without modulation and thus, the envelopes do work as the independent wave packets.

First solution of the NLSE was the Kuznetsov-Ma (KM) breather [35, 36] and we consider also a Kuznetsov-Ma breather type solution for perturbation of the carrier wave in deep saturation nonlinearity. This solution does show the localized pulsation of the background wave as the periodic noise.

The experimental results in the optical fibers e.g. [5] verify that the Kuznetsov-Ma breather is matched with real term $\text{Re}\{\varphi\}$ and in fact the imaginary term $\text{Im}\{\varphi\}$ can be imaginary and then the physical answer is real term of the Eq. (3), that is,

$$\varphi = \left[\frac{2(1-2a)\cos\left(\sqrt{8a(2a-1)}\tau\right)}{\sqrt{2a}\cos\left(2\sqrt{1-2a}\xi\right) - \cos\left(\sqrt{8a(2a-1)}\tau\right)}\right] \tag{4}$$

Notice that $\cosh(i\tau) = \cos(\tau)$ and then in the Kuznetsov-Ma breather solution in which a > 1/2, we have $\cosh\left(\sqrt{8a(1-2a)}\tau\right) = \cos\left(\sqrt{8a(2a-1)}\tau\right)$.

However if we use the φ included to both of the imaginary and real terms, the solution numerically is still near to the Eq. (4) and difference is neglect-able.

2.2 The evidences for the theoretical arguments

5G sideband waves are background carrier wave which in the nonlinearity yields to the relevant instabilities. The description of instabilities in optics as rogue waves is recent, however, first used in 2007 when shot-to-shot measurements of fiber supercontinuum (SC) spectra by Solli *et al.* yielded long-tailed histograms for intensity fluctuations at long wavelengths [37].

On the modulation instability of the 5G media, however the 5G monochromatic waves do not directly affect the cells but producing extremely low frequency envelope impulses which are enable to influence into the cells. The scale invariance in the deep saturation nonlinearity according to the Eq. (2) yields to the answer as the full family of the self-similar solutions (intensity in the term $|\varphi|^2$) that

$$|\varphi|^2 = \sum_{n=0}^{+\infty} \left| \varepsilon^{-n} \varphi\left(\varepsilon^n \xi, \varepsilon^{2n} \tau\right) \right|^2 \tag{5}$$

Very short period waves are neglected actually and very long waves are trivial in short time (in the scale of lesser than several years) and then actually we can consider a solution as a suit of four consequent envelopes from the Eq. (5) in series of $n = \{0, 1, 2, 3\}$.

The time τ is free scale mathematically and we can rescale $\tau + \pi/2 \rightarrow \tau\sqrt{8a(2a-1)}$. We assume arbitrary the frame center at point $\xi = 0$ and then by the Eqs. (4), (5) we deduce for $n = \{0, 1, 2, 3\}$, an actual answer as follows

$$|\varphi|^2 = \left[\varepsilon^{-3} \left| \frac{2(2a-1)\sin\left(\varepsilon^6 \tau\right)}{\sqrt{2a} - \sin\left(\varepsilon^6 \tau\right)} \right| + \varepsilon^{-2} \left| \frac{2(2a-1)\sin\left(\varepsilon^4 \tau\right)}{\sqrt{2a} - \sin\left(\varepsilon^4 \tau\right)} \right| + \varepsilon^{-1} \left| \frac{2(2a-1)\sin\left(\varepsilon^2 \tau\right)}{\sqrt{2a} - \sin\left(\varepsilon^2 \tau\right)} \right| + \left| \frac{2(2a-1)\sin(\tau)}{\sqrt{2a} - \sin(\tau)} \right| \right]^2 \tag{6}$$

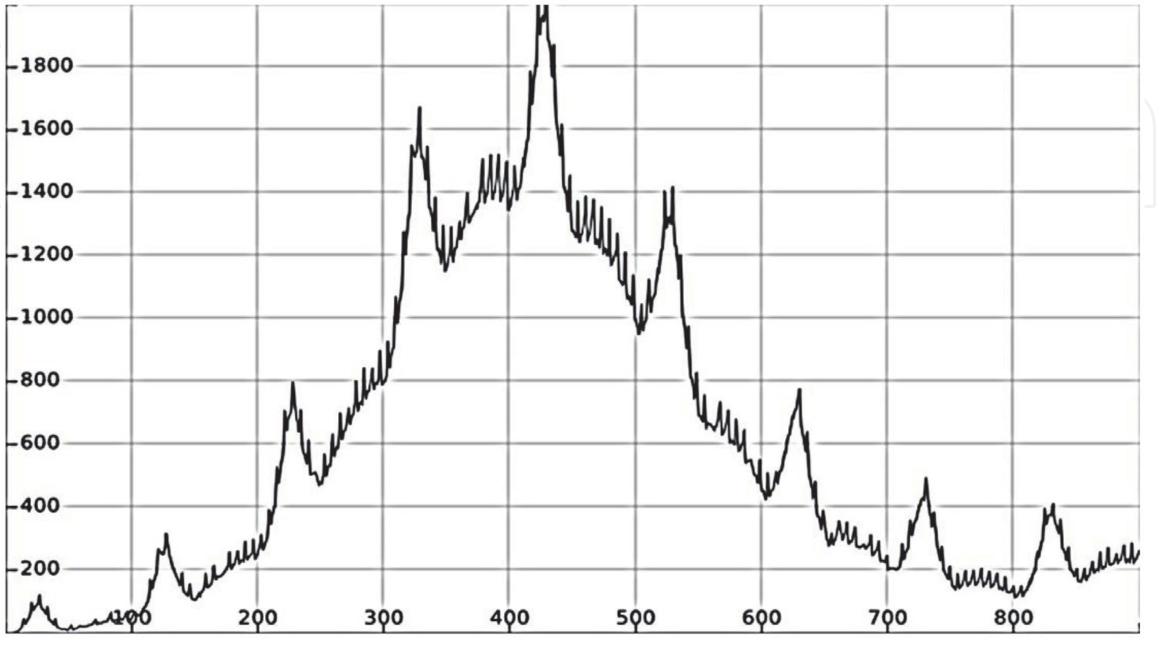

Figure 1.
Theoretical wave (self-similar corona-like) solution of covid-19 infection pattern for $a = 1, \varepsilon = 1/4, k_I = 1/5$ *driven by the Eqs. (6), (7).*

If corona virus infection cases per time symbolized here by n_I relates to 5G wave's breather amplitude $|\varphi|^2$, thus there should be exist a coefficient k_I to correlate the intensity of 5G perturbation envelopes to the infection of the corona virus as

$$n_I = k_I|\varphi|^2 \tag{7}$$

The infection cases per time interval symbolized here with n_I in unit K (cases/time) is drawn on the Eqs. (6), (7) in **Figure 1** with the best fit in $\varepsilon = 1/4$, a = 1, k_I = 1/5 (K in vertical axis and time in horizontal axis in the radians scale). Transferring the time from radians to the date, the wave pattern matches nicely with covid-19 infection pattern reported by live such as www.worldometers.info. The domain and time scales of the wave envelopes match with covid-19 infection pattern as compared in the **Figure 2**.

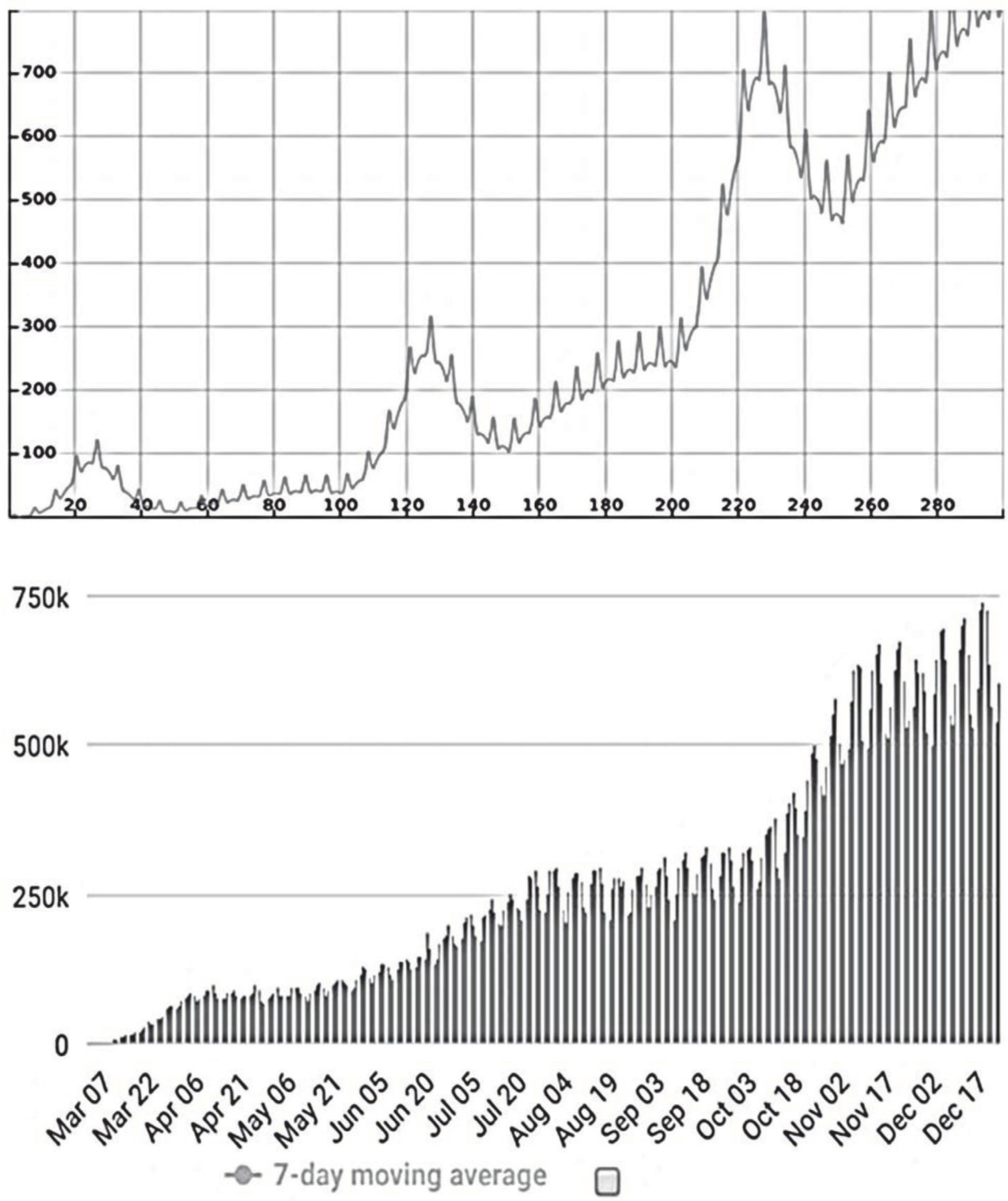

Figure 2.
Covid-19 infection pattern to date (below diagram) compared to 5G perturbation pulses in the time scaled with radians (above diagram).

The corona virus is transmitted by human to human biologically and thus, the biologic spreader effect moderates extremes of the physical waves. For example if the antennas do not work for a short time, still the covid-19 is continued for moderation of the biological effects. Of course deviation from the physical source will appear along the time. In reality the 5G internet media includes the antennas distributed in the earth and thus, the phase of the perturbation envelopes can vary by changes in the antennas.

By the way via comparing the covid-19 infection diagram with the wave solution Eq. (6) along the year 2020, still the covid-19 is matched with the Kuznetsov-Ma wave solution of the NLSE both in the phase and shape of the wave. We have drawn the pure wave solution (above diagram in the **Figure 2**.) without moderation of the extremes and then difference in the intensity between the diagrams of the wave solution and covid-19 infection pattern is natural. In reality the above diagram in the **Figure 2** which is for Kuznetsov-Ma breather should be moderated to fit in the intensity with below diagram in the **Figure 2** which is for covid-19 infection cases. The 5G injection effect of the parasite pulses in the cells does not depend to the cases-age but deaths per time interval symbolized here by n_D depends to the

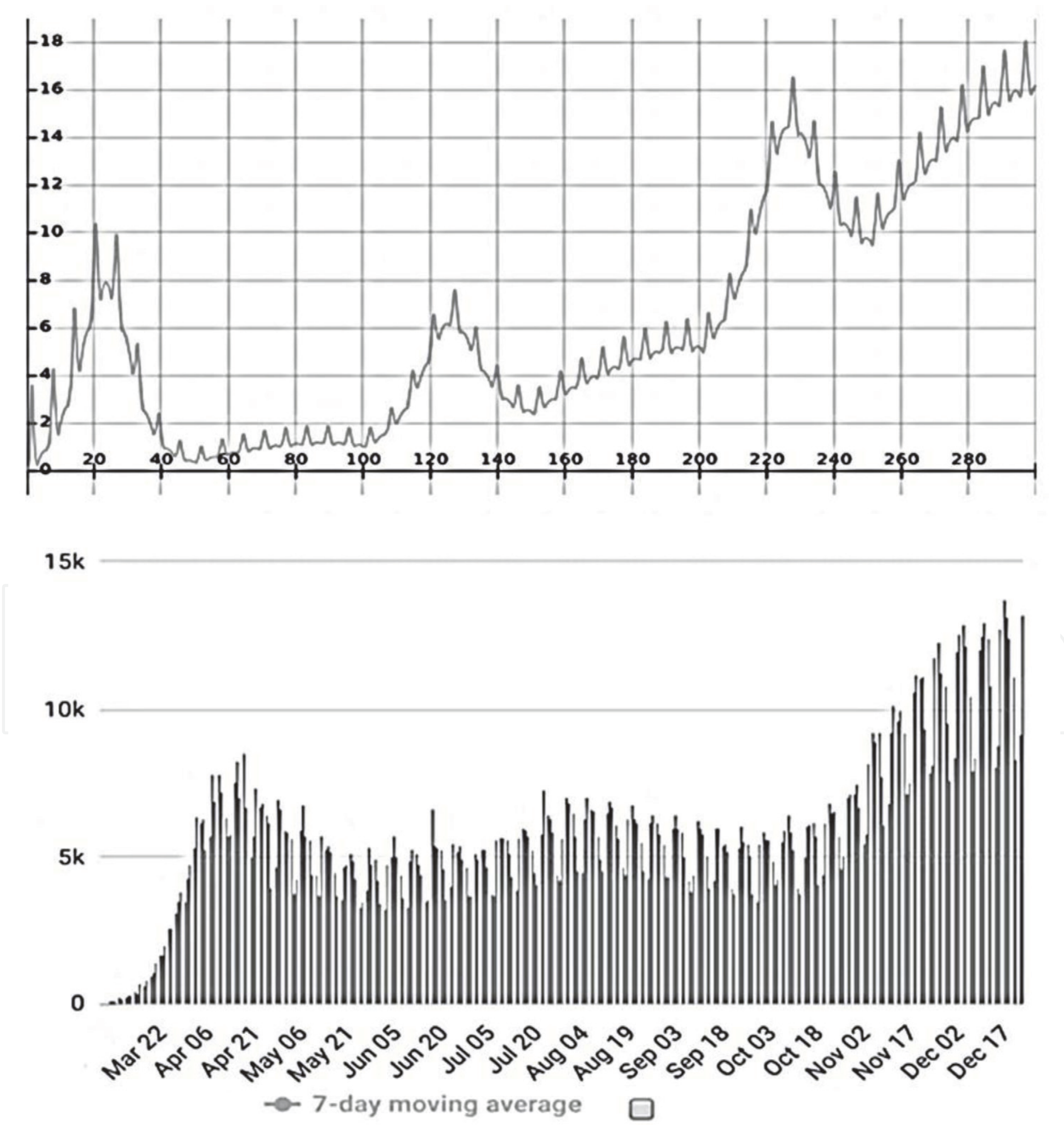

Figure 3.
Covid-19 death cases pattern (below diagram which is copied from online corona-meter web) compared with the ϕ^2 *from Eq. (6).*

cases-age. The index n_D/n_I is larger for elders. The population of elder cases is decreased proportionally along the time and then the index n_D/n_I is flattening rapidly to asymptotic size ~ 0.02. We find numerically a function for damping effect of the index n_D/n_I as follows

$$n_D/n_I = \left[0.02 + \frac{`1}{1 + 0.3\tau + 0.005\tau^2}\right] \tag{8}$$

An initial shock wave is observed for death cases in onset of the covid-19 pandemic which is flattening asymptotically to the normal size. This is matched with daily deaths observed in covid-19 (**Figure 3**).

The wireless antennas have potential to transfer the earth to the nonlinear media as the source of extremely low frequency (ELF) electromagnetic envelopes (Trojan horse) affecting the cells, disordering the genome and damaging the species which may be visible in the next generations the more.

3. Conclusions

However the 5G broadband electromagnetic pump waves are blocked mainly and environmentally disable to pass the skin but on the nonlinearity of 5G internet media as a result of modulation instability we find extremely low frequency perturbation parasites as the solution of nonlinear Schrodinger equation (NLSE), enable to pass the skin and disordering the genome as the potential link between the 5G and covid-19. Accordingly the global patterns of the corona virus infection and death cases follow the Kuznetsov-Ma type breather solution of the NLSE which is a perturbation envelope. In detail we find that the global patterns (infection and death) of the corona virus is matched with deep saturation nonlinearity of 5G internet broadband media which yields to a self-similarity of the infection and death cases global patterns of the corona virus.

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Conflict of interest

The authors declare no conflict of interest.

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