Analysis of self-regulated processes in optical fields

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In this work we analyze the evolution of a wave process and describe the synthesis of non-linear effects, by the study of the topological properties and the wave-diffusion transitions effects [1] of the optical field, which induce self- regulated effects; this kind of effects are present near of regions of maxim energy.

In this context the optical field is described as a complex system that presents an asymptotic behavior near the maxim irradiance region which generates entropy effects.

The study is made by the phase function [2] and irradiance driven by a logistic model in the refractive index, which allows us to identify physical properties in regions where singularities of the field exist and the traditional optical models cannot be applied.

With this model we want to explain how the focal regions interact, which explains the generation of optical networks as the pool effect [2], and the generation of a beam rope in the vacuum through zone plates, which can be used to generate new ways of transmitting information.

References

[1] Martinez Niconoff, G., P. Martinez Vara, S. I. De los Santos Garcia, M. A. Torres-Rodriguez, M. Vargas Morales, and E. Saldivia Gomez, 2018: Analysis of wave-diffusion transitions in optical fields. *J. Mod. Opt.* **65**, 2290–2294.

[2] Berry, M. V., 1980: Catastrophe optics: morphologies of caustics and their diffraction patterns. *Prog. Opt.* **18**, 257–346.

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