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Photonic effects in natural nanostructures¹ RAFAEL RAMN REY GONZLEZ, CLAUDIA PATRICIA BARRERA PATIO, Grupo de Óptica e Información Cuántica, Departamento de Física, Universidad Nacional de Colombia, Ciudad Universitaria, C.P. 111321, Bogotá — Nature exhibits a great variety of structures and nanostructures. In particular the interaction light-matter has a strong dependence with the shape of the nanostructures. In some cases, in the so called structural color, ordered arrays of nanostructures play a very critical role. One of the most interesting color effects is the iridescence, the angular dependence of the observed color in some species of butterflies, insects, plants, beetles, fishes, birds and even in minerals. In the last years, iridescence has been related with photonic properties. In the present work, we present a theoretical study of the photonic properties for different patterns that exist in natural nanostructures present in wings of butterflies that exhibit iridescence. The nanostructures observed in these cases present spatial variations of the dielectric constant that are possible to model them as 1D and 2D photonic crystal. Partial photonic gaps are found as function of lattice constant, dielectric contrast and geometrical configuration. Also, disordered effects are considered.

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Rafael Ramn Rey Gonzalez
Universidad Nacional de Colombia

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