Meiji University
Center for Mathematical Modeling and Applications

CMMA Monthly Seminar
第10回CMMA月例セミナー

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Abstract

Optical illusion is the phenomenon in which what we perceive is different from physical reality. It is automatically induced regardless of our consciousness. Thus optical illusion is a natural phenomenon in our visual perception. In our visual processing, it is known that a brightness stimulus is converted to an electrical signal by passing through several processes. It is an important property that brightness stimulus is emphasized and controlled in its processes. In this study, we assume that the blur effect, the contrast effect, and the assimilation effect operate to brightness stimulus in our visual processing. The blur effect corresponds to a conversion degree of an electrical signal in the photoreceptor cell for brightness stimulus received in the retina. The contrast effect plays a role which emphasize difference in its electrical signal, and the assimilation effect plays its reversal effect. In the spatial frequency characteristics, it is known that high spatial frequency induces an assimilation phenomenon and low spatial frequency induces a contrast phenomenon. That is, it is considered that superiority of its two effects switch for converted brightness stimulus. In this presentation, we propose a mathematical model assuming the above three effects. By mathematical analysis, we derive an integral equation for time-independent problem and show a necessary and sufficient condition that its integral kernel is a function type called Mexican-hat. Moreover, we discuss perceptions of optical illusions such as the spatial frequency characteristics by numerical simulations.

"A reaction-diffusion model for understanding optical illusions"

日時：2016年1月13日（水） 17:00-18:00
場所：明治大学 中野キャンパス高層棟6階 研究セミナー室3

主催：
文部科学省 共同利用・共同研究拠点
明治大学先端数理科学インスティテュート
現象数理科学研究拠点（CMMA）

MIMS

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