

理论研究

## 高聚物与光场相互作用的微观机制

薛春荣, 马丽

常熟理工学院物理与电子科学系, 江苏常熟215500

收稿日期 修回日期 网络版发布日期 2007-7-13 接受日期

**摘要** 分析光场与高聚物相互作用的微观机制, 介绍高分子与小分子在光场作用下的极化过程。对在窄束光场作用下, 高分子链极化后链上各处极化程度的分布情况进行研究, 指出对于高度拉伸的聚合物薄膜, 电偶极子模型不适合准确解释高分子与光场相互作用的微观机制。为此, 采用符合实际的天线模型分析高分子天线与窄束光场的相互作用, 从理论上推导出天线模型高分子链上一小段的极化公式, 并用离散变分方法——DVM (discrete variational method) 计算一个高分子链的极化分布, 验证了文中推导出的分式的合理性。最后, 将极化分布看作是电流在天线上的分布, 计算了天线的次级辐射在空间中的角分布, 得到天线模型对电偶极子模型的修正因子。

**关键词** [高聚物](#) [光场](#) [天线模型](#) [辐射](#)

**分类号** [0631.2](#)

## Micro-mechanism interacting between high polymer and light field

XUE Chun-rong, MA Li

Department of Physical and Electronic Science, Changshu Institute of Technology, Changshu 215500, China

**Abstract** The micro mechanism interacting between optical field and high polymer is analyzed, the polarization process of high polymer and small molecule under the effect of the light field is introduced. The distribution of polarization on the high polymer chain which has been polarized is analyzed in narrow beam optic field. The analysis indicates that for the tension thinning film made from polymer, the dipole model can not be used to explain the mechanism interacting between high polymer and optic field. An antenna model is adopted and investigated in detail. The polarization formula of high polymer chain of aerial mode is theoretically derived, and its validity is verified through calculating the polarization distribution with DVM. Assuming the polarization distribution is the same as the distribution of the electric current on the aerial, the angle distribution of the aerial secondary radiation is calculated, and the modification factor of electric dipole model is obtained.

**Key words** [high polymer](#) [light field](#) [antenna model](#) [radiation](#)

DOI:

通讯作者 [薛春荣 xcr163@163.com](mailto:xcr163@163.com)

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(243KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

#### 服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

#### 相关信息

- ▶ [本刊中 包含“高聚物”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [薛春荣](#)
- [马丽](#)