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| Team Number : | apmcm2101137 |
| Problem Chosen : | B |

2021 APMCM summary sheet

**摘要：**热光伏技术是一种使用各种热源加热热发射器（吸收器）的技术，通过光伏电池将热发射器的红外辐射转换为电辐射。为了提高热光伏系统的热电转换效率，必须调节热发射器的发射光谱。发射光谱的计算方法主要包括传递矩阵法（TMM）、有限差分时域法（FDTD）和严格耦合波分析法（RCWA）。影响热发射器发射光谱的主要因素是材料的光学性能（折射率或介电常数）和结构性能（厚度）。本文以上述理论和三种计算方法为基础，以MATLAB，Python，SPSS，Microsoft Excel等软件为工作平台，构建了相应的模型。

**关键词：**带隙波长，热电转换效率，发射光谱

**Abstract:** thermal photovoltaic technology is a technology that uses various heat sources to heat the heat emitter (absorber), and converts the infrared radiation of the heat emitter into electrical radiation through photovoltaic cells. In order to improve the thermoelectric conversion efficiency of thermal photovoltaic system, the emission spectrum of thermal emitter must be adjusted. The calculation methods of emission spectrum mainly include transfer matrix method (TMM), finite difference time domain method (FDTD) and rigorous coupled wave analysis (RCWA). The main factors affecting the emission spectrum of thermal emitter are the optical properties (refractive index or dielectric constant) and structural properties (thickness). Based on the above theories and three calculation methods, this paper constructs the corresponding model with MATLAB, python, SPSS, Microsoft Excel and other software as the working platform.

**Key words:** band gap wavelength, thermoelectric conversion efficiency, emission spectrum

Contents

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