Rancang Bangun Modul Eksperimen Penentuan Koefisien Refleksi dan Transmisi Cahaya Terpolarisasi Linier = Design and Development of an Experimental Module for Determining the Coefficient of Reflection and Transmission of Linearly Polarized Light

Fabiansyah Rinanto Suryadi, author

Abstrak

Penelitian ini bertujuan merancang dan membangun modul eksperimen untuk menentukan koefisien refleksi dan transmisi cahaya terpolarisasi linier. Modul yang dikembangkan menggunakan sistem optik dan elektronik berbasis mikrokontroler untuk memfasilitasi pengukuran intensitas cahaya sebelum dan sesudah interaksi dengan media optik. Sistem ini dilengkapi dengan laser RGB sebagai sumber cahaya, beam splitter 50:50, polarized beam splitter (PBS), sensor BH-1750FVI, serta sistem rotasi menggunakan stepper motor. Melalui variasi sudut datang dan panjang gelombang cahaya, dilakukan pengukuran intensitas untuk polarisasi s dan p. Hasil pengujian menunjukkan bahwa modul mampu mengamati fenomena sudut Brewster dan memisahkan komponen polarisasi secara efektif. Modul juga memiliki akurasi pengukuran sudut hingga ±1°, memungkinkan penentuan sudut penting dan Brewster secara tepat. Namun, pengukuran intensitas belum akurat, sehingga penentuan koefisien refleksi dan transmisi berdasarkan intensitas tidak dapat dilakukan secara kuantitatif. Dengan demikian, koefisien hanya dapat dianalisis melalui pengamatan sudut. Penelitian ini menghasilkan prototipe alat eksperimen optik yang representatif dan berpotensi digunakan dalam pembelajaran praktikum fisika lanjutan dengan pengembangan lebih lanjut.
.....This research aims to design and develop an experimental module for determining the reflection and transmission coefficients of linearly polarized light. The developed module integrates optical and microcontroller-based electronic systems to facilitate the measurement of light intensity before and after interaction with an optical medium. The system includes an RGB laser as the light source, a 50:50 beam splitter, a polarized beam splitter (PBS), BH-1750FVI sensors, and a rotational mechanism using stepper motors. By varying the angle of incidence and the light wavelength, measurements are conducted for both s- and p-polarized components. Experimental results show that the module is capable of observing the Brewster angle phenomenon and effectively separating polarization components. The module also achieves angular measurement accuracy of up to ±1°, enabling precise determination of critical and Brewster angles. However, due to limited accuracy in intensity measurements, the reflection and transmission coefficients cannot be quantitatively determined based on intensity data. Therefore, analysis of these coefficients is conducted through angular observation. This research has produced a representative prototype of an optical experiment tool, which holds potential for use in advanced physics laboratory courses with further development.