

ABSTRACT

This thesis presents the experimental study and design of a coherent communication system by using phase shift keying (PSK). Systems are designed by using all passive elements, which make the system very easy to operate, and less maintenance is required. All the PSK designs are based on a single light source. In this thesis there are five different types of PSK with a single light source communication systems are designed. All designs are experimentally tested in free space. The systems are "All optical two-channel PSK communication system, by using single light source", "All optical single channel, two-way PSK communication, by using a single light source", "Two-way single channel PSK communication, using a time delay unit", "Two-way single channel PSK communication without a delay unit", "All optical two-channel, two-way PSK communication, by using a single light source", and " Coherent length dependent multi-channel PSK communication system using a single light source". Interaction of different channels in the same system is also studied. Solutions are proposed for the presence of interference in the multi-channel system. The main thrust of the work relies on dividing and redirecting the light wave from a single light source for PSK coherent communication.

ABSTRAK

Tesis ini membicarakan mengenai eksperimen dan rekabentuk sistem komunikasi koheren menggunakan penguncian anjakan fasa (Phase Shift Keying, PSK). Elemen-elemen pasif digunakan di dalam sistem yang telah direkabentuk untuk memudahkan pengoperasian sistem dan mengurangkan kerja-kerja penyelenggaraan. Lima jenis PSK dengan menggunakan satu sumber cahaya telah diuji secara eksperimen dalam ruang bebas iaitu "Satu sumber cahaya, dua-saluran optik sistem komunikasi", "Satu saluran optik, komunikasi PSK dua-arah dengan menggunakan satu sumber cahaya", "Satu saluran dengan komunikasi PSK dua-arah menggunakan unit lengahan masa", "Satu saluran optik dengan komunikasi PSK dua-arah tanpa unit lengahan masa", "Dua saluran optik dengan komunikasi PSK dua-arah menggunakan satu sumber cahaya" dan "Pelbagai saluran komunikasi PSK menggunakan satu sumber cahaya bergantung kepada panjang koheren". Saling-hubung di antara saluran-saluran juga dikaji. Interferens diperolehi apabila pelbagai saluran digunakan dan penyelesaian terhadap masalah ini dicadangkan di dalam tesis ini. Gelombang cahaya terbahagi dan tertuju-semula digunakan dalam komunikasi koheren PSK yang besar.