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Slow Light and Stored Light Phenomena of Love Wave within a Thin Film

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A novel optical theoretical model of the Love wave within thin films covered with a semi-infinite media is derived in details, and further excellent slow light and stored light phenomena in a thin film are found for the first time. Based on this propagation model and the optical Love wave theory, the dispersion relation and the group velocity expression are both obtained exactly, then the mechanism of slow light and stored light phenomena is put forward, and the influences of the light frequency, the thickness of the thin film, the permittivity ratio between the thin film and the semi-infinite media, and their refractive indexes on the group velocity are analyzed. Due to the semi-infinite media, we obtain the excellent optical phenomena of the Love wave that are caused by both the thin film structure and boundary conditions, and when the semi-infinite media is vacuum, the Love Wave model will degenerate into thin films slow light. The slow light and stored light phenomena in a thin film could have potential applications in the data storage field.

Keywords: Slow Light; Stored Light; Love Wave; Thin Films

1. INTRODUCTION

Over the past twenty years, scientists have been intrigued by the possibility of using various optical methods to exercise extraordinary control over the propagation velocity of light pulses through material systems. Exotic effects, such as slow light, fast light and even stored light, have been observed in laboratory,

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