

Optical Processes Tailored by Glass Plates

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We describe an optical device that can arbitrarily manipulate phase relationships among a group of highly-discrete spectral modes [1,2]. The device is very simply constructed; we place a transparent dispersive plate on an optical axis and precisely manipulate its thickness over a relatively wide thickness range (typically the order of mm). We show the detail of physical mechanism why such an optical phase manipulation can be realized. We also show a few examples when we apply such an optical device to linear and nonlinear optical processes. In the linear optical process, we show continuous generation of 620-as ultrashort pulses [3]. In the nonlinear optical process, we show that Raman-resonant four-wave-mixing process is manipulated on demand [4-8].

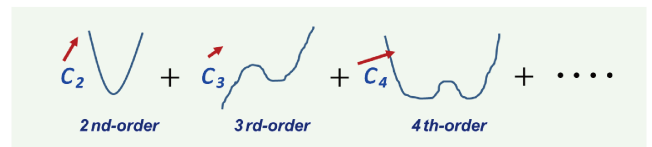
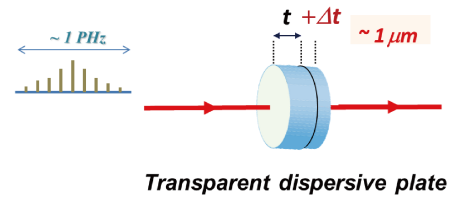


Figure 1: Conceptual illustration of an optical device which arbitrarily manipulates optical phases among highly-discrete spectral modes

References

- [1] M Katsuragawa and K Yoshii, Phys. Rev. A **95**, 033846 (2017)
- [2] K Yoshii, J K Anthony and M Katsuragawa, Light Sci. Appl. **2**, e58 (2013)
- [3] C Zhang, K Yoshii, D Tregubov, C Ohae, J Zheng, M Suzuki, K Minoshima and M Katsuragawa, Phys Rev A **100**, 053836 (2019)
- [4] J Zheng and M Katsuragawa, Sci. Rep. **5**, 8874 (2015); arXiv: 1406.3921 (2014)
- [5] C Ohae, J Zheng, K Ito, M Suzuki, K Minoshima and M Katsuragawa, Opt. Express **26**, 1452 (2018)
- [6] C Ohae, J Zheng, K Ito, M Suzuki, K Minoshima and M Katsuragawa, in: Nonlinear Optics, OSA Technical Digest (online), Optica Publishing Group, 2017, paper NM3B.1
- [7] W Liu, C Ohae, J Zheng, S Tahara, M Suzuki, K Minoshima, H Ogawa, T Takano and M Katsuragawa, Commun. Phys. **5**, 179 (2022)
- [8] C Ohae, W Liu, J Zheng, M Suzuki, K Minoshima and M Katsuragawa, in: Nonlinear Optics, OSA Technical Digest, Optica Publishing Group, 2019, paper NTu1B.5