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## Effects of the second-order vector mode on weak lensing signals

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Vector mode of cosmological perturbation theory imprints characteristic signals on the weak lensing signals such as curl- and B-modes which are never imprinted by the scalar mode.

However, the vector mode is neglected in the standard first-order cosmological perturbation theory since it only has a decaying mode.

This situation changes if the cosmological perturbation theory is expanded up to second order.

The second-order vector and tensor modes are inevitably induced by the product of the first-order scalar modes.

We study the effect of the second-order vector mode on the weak lensing curl- and B-modes.

We find that the curl-mode induced by the second-order vector mode is comparable to that induced by the primordial gravitational waves with the tensor-to-scalar ratio  $r = 0.1$  at  $\ell \approx 200$ .

In this case, the curl-mode induced by the second-order vector mode dominates at  $\ell > 200$ .

Furthermore, the B-mode cosmic shear induced by the second-order vector mode dominates on almost all scales.

However, we find that the observational signatures of the second-order vector and tensor modes cannot exceed the expected noise

of ongoing and upcoming weak lensing measurements.

We conclude that the curl- and B-modes induced by the second-order vector and tensor modes are unlikely to be detected in future experiments.

**Author:** Mr SAGA, Shohei (Naogya university)

**Co-authors:** Dr YAMAUCHI, Daisuke (The University of Tokyo); Dr ICHIKI, Kiyotomo (Nagoya university)

**Presenter:** Mr SAGA, Shohei (Naogya university)

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