

X39a Construction of Multidimensional Luminosity/Mass Function of Galaxies with Vine Copula

Tsutomu T. TAKEUCHI (Nagoya University)

The need for a method to construct multidimensional distribution function is increasing recently, in the era of huge multiwavelength surveys. We have proposed a systematic method to build a bivariate luminosity or mass function of galaxies by using a copula, and shown its performance (Takeuchi 2010). It allows us to construct a distribution function when only its marginal distributions are available. A typical example is the situation that we have univariate luminosity functions at some wavelengths for a survey, but the joint distribution is unknown. Main limitation of the copula method is that it is not easy to extend a joint function to higher dimensions ($D > 2$), except some special cases like Gaussian.

In this presentation, we show a systematic method to extend the copula to unlimitedly higher dimensions by a Vine copula. This has been mainly applied to economical problems. We show its flexible extendability by using some multiwavelength galaxy survey data.