Understanding of Cosmology

1 Introduction

2 Relationship between H(z) and distance calculation

An important thing to realize is that if $c = 1$, then $v = z$. That is z is not only the scale factor ($a = 1/(1+z)$), but also the velocity of expansion.

Also, Hubble's law at any z is just the first term of the Taylor expansion (the first derivative) of the expansion history.

$$H(z) = dv/dD_M = dz/dD_M$$

$$dD_M = dz/H(z)$$

$$D_M = \int_0^z \frac{dz}{H(z)}$$

$$D_M = \frac{1}{H_0} \int_0^z \frac{dz}{E(z)}$$

This leads to eq (1) of Riess 2017.

Locally, if one removes H_0, one gets $v(z)$, which is eq (2) of Zhang 2017