Cosmological Perturbations

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Following [1, ch. 5].

$$g = g^{(0)} + \epsilon g^{(1)} + O(\epsilon^2) \tag{1}$$

$$g^{(0)}_{\mu\nu}\,\mathbb{d}x^\mu\,\mathbb{d}x^\nu = -N^2(t)\,\mathbb{d}t^2 + a^2(t)\,\mathbb{d}\Omega_3^2 \tag{2}$$

$$g^{(1)}_{00} = -E, \tag{3}$$

$$g^{(1)}_{i0} = g^{(1)}_{i0} = a\big(F_{,i} + G_i\big), \tag{4}$$

$$g^{(1)}_{ij} = a^2\big(A\delta_{ij} + B_{,i,j} + C_{i,j} + C_{j,i} + D_{ij}\big). \tag{5}$$

References

[1] Steven Weinberg. *Cosmology*. Oxford University Press, 2008. ISBN: 9780198526827. URL: https://global.oup.com/academic/product/cosmology-9780198526827.