

$$\mathbb{F}_{k_2}(A, B) = 1 - \zeta(2) AB + \zeta(2) BA$$

$$- \zeta(3) A^2 B + 2\zeta(3) ABA + \zeta(1,2) AB^2 - \zeta(3) BA^2 - 2\zeta(1,2) BAB + \zeta(1,2) B^2 A$$

$$- \zeta(4) A^3 B + 3\zeta(4) A^2 BA + \zeta(1,3) A^2 B^2 - 3\zeta(4) ABA^2 + \zeta(2,2) ABAB - (2\zeta(1,3) + \zeta(2,2)) AB^2 A$$

$$- \zeta(1,1,2) AB^3 + \zeta(4) BA^3 - (2\zeta(1,3) + \zeta(2,2)) BA^2 B + (4\zeta(1,3) + \zeta(2,2)) BABA + 3\zeta(1,1,2) BAB^2$$

$$- \zeta(1,3) B^2 A^2 - 3\zeta(1,1,2) B^2 AB + \zeta(1,1,2) B^3 A + \dots$$