Tenth order correction to the lepton anomaly from some bubble-type diagram

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Analytical expressions for the tenth-order electromagnetic correction to the lepton ($L = e, \mu, \tau$) anomaly, a_L, are derived explicitly for the Feynman diagram involves the vacuum polarization insertion of four closed lepton, three of which are formed by a lepton L of the same kind as the external one. A method based on consistent application of the dispersion relations for the polarisation operator and the Mellin--Barnes transform for propagators of massive particles, was presented in our previous papers. The result is expressed in terms of the mass ratio $r = m_\ell / m_L$. From the exact analytic expressions we find the asymptotic expansions at $r \to 0$ and $r \to \infty$ and compare them with the corresponding expansions known in the literature. We estimate the interval for the mass relation in which the approximate expansions practically coincide with the exact formulas.