$$a_{12} = (\mu_{11}^2 + \mu_{22}^2)/2, \qquad a_{22} = (\mu_{12}^2 + \mu_{22}^2)/2$$

and $g(u) = e^{-u/2} u^{s} / \Gamma(s+1) 2^{s+1}$

It is to be noted again that in (22), the second sum runs over $\lambda = \mu_{1r_1}^2 + \dots + \mu_{nr_n}^2$. Now if we consider two independent variables v, u, each having p.d.f. (22) and if we set $F = [(u/m)/(v/n)]$ and integrating out v in $f(v) f(F \cdot v \cdot \frac{m}{n})$, we get, the resulting distribution as

$$f(F) = \sum \sum \theta_1^{l_1 + m_1} \dots \theta_k^{l_k + m_k} \sum \sum \exp[-(\lambda + \delta)] \cdot \sum_{r=0}^{\infty} \sum_{s=0}^{\infty} \frac{\lambda^s \delta^r}{s!\, r!} g(F),\ F > 0 \quad (24)$$

where

$$g(F) = \frac{(m/n)^{\frac{m}{2}+s} F^{\frac{m}{2}+s-1}}{B(\frac{m}{2}+s, \frac{n}{2}+r)(1+\frac{m}{n}F)^{\frac{m+n}{2}+r+s}} \quad (24a)$$

where in (24), first two sums are on l_j's and m_j's and second two sums are on μ_{jr_j}'s and δ_{jr_j}'s. (22) and (24) are respectively the mixture of non-central chi-square and doubly non-central F distributions. The non-centrality-parameter varies from term to term according as the second sum in (22). Further, probability integral from (24) is easy to compute using [18]. Only thing new is the evaluation of the non-centrality parameter at each step

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