The effective algorithm is given for estimating two dimensional directions of arrivals which appear in the field such as radar, sonar, communications or smart antenna. This algorithm consists of solving the linear equation with matrix of FLOST moments and FLOST correlations which are calculated from observations, that is, mixture of signals from two directions and noises. Impulse noises are independent $S^{\alpha}$ random variables which are not Gaussian and have a parameter $\alpha$. The FLOM (fractional lower-order moment) for random variables $\xi, \eta$ is defined by 
\[
E\left\{\xi |\eta|^{p-2}\eta^*\right\}, \quad 1 < p < \alpha \leq 2
\]
where the superscript $^*$ denotes complex conjugate. Signals $s_k(t), k = 1, 2, \cdots D$ with time $t$ are assumed to have FLOST moments $\rho_{kj}(\tau) = [s_k(t+\tau), s_j(t)]_f$ with mutually FLOST uncorrelatedness $\rho_{kj}(\tau) = 0, k \neq j$. If the eigenvalue spectrum is degenerate when solving linear equation, the FLOST matrix algorithm should be refined. This paper improves this case by using whitening and introducing the joint diagonalization FLOST matrix. Simulation results show that the proposed methods lead to better performance, especially for low signal-to-noise ratio case.