by particles of species 1 (smaller species) and the nematic phase by particles of species 2 (larger species). The biphasic region, where there is coexistence between the isotropic and nematic phase, is very narrow in FMT. At zero composition, Onsager theory predicts a density jump of $\sim 22\%$ whereas this is only $\sim 9\%$ for FMT, which agrees more closely to simulation results of 8% [61]. The bifurcation concentration for FMT is $c_* = 0.434$ at $x = 0$ and $c_* = 0.434/\lambda^3 = 0.326$ at $x = 1$. The spinodal for FMT lies closer to the isotropic phase boundary than the nematic phase boundary (whereas the converse is true for Onsager theory). Fig. 1b shows the same results but in the (c_1, c_2) representation. The results for both theories again interpolate smoothly between the two pure limits. The two branches of the binodal in this representation move from the c_1-axis to the c_2-axis with increasing composition. Hence the tie lines move from being horizontal on the c_1-axis to vertical on the c_2-axis. In the (x, p^*) representation (Fig. 1c) the tie lines are horizontal due to the requirement of equal pressure in the coexisting phases. The spinodal lies above the nematic branch of the binodal in this representation because it is obtained by inserting the bifurcation densities into the isotropic equation of state, which yields a higher pressure than the coexistence value. The binodal obtained from FMT is located at significantly smaller densities as compared to that from Onsager theory. The isotropic end of the tie line is at a lower composition than the nematic end of the tie line. For Onsager theory at zero composition, the isotropic branch of the binodal intersects the c-axis at $c_I = 0.666$ and the nematic branch intersects at $c_N = 0.849$, in agreement with the monodisperse limit found in earlier work [52]. The binodals interpolate smoothly from $x = 0$ to $x = 1$ where the values of c corresponding to the I-N coexistence concentrations are $c_I = 0.5$ and $c_N = 0.638$. The nature of the tie lines is similar to FMT. The I-N spinodal lies between the two branches of the binodal and interpolates smoothly from zero composition, where $c = 8/\pi^2 = 0.811$ to $x = 1$ where $c_* = 0.609$.

The nematic phase of a mixture of two components can be characterised by two partial nematic order parameters, S_1 and S_2 defined by

$$S_i = 4\pi \int_0^{\frac{\pi}{2}} d\theta \sin\theta \Psi_i(\theta) P_2(\cos\theta). \tag{50}$$

The total nematic order parameter is the weighted average

$$S_{\text{tot}} = (1 - x)S_1 + xS_2. \tag{51}$$