The article presents a study, important for optics and physics of snow. It improves our understanding of snow microstructure. The authors attract our attention to the importance of the third term of the expansion of the correlation function, related to the curvature of the air-ice interface. One of the achievements of the work is the correlations between the microstructure parameters, both short-scale and long-scale, which are established experimentally by investigating the snow samples.

There are some points to discuss.

1. The authors state that the second term in $A(r)$ expansion (and therefore $p(0)$) is equal to zero and explain that this is a direct consequence of the interface smoothness. However, the widely used (e.g., by Debye) exponential function for $A(r)$ has the obviously nonzero second term. At the same time, there are interface models, such as the Switzer model, that provides strictly exponential correlation function. Particularly, in the Switzer model the space is dissected by a set of random planes into random polyhedrons and the resulting polyhedrons are assigned to ice with the probability ϕ and to air with the probability $1-\phi$. This interface is not smooth: it has plane facets and sharp edges. Obviously, it doesn't match the morphology of aged snow, but fresh snow seems to be much closer to the Switzer interface than to smooth one, because of the facets and edges of ice crystals. With this in view and taking into account the importance of the exponential correlation function, it would be extremely desirable to discuss the facet-edge interface and its relationships with the smooth one.

2. The motivation of Eq. (15) looks invalid. In general, the integral of a function from 0 to ∞ is not determined by its behavior at 0. More precisely, the authors say that "A(r) depends at least on two independent length scales, λ1 and λ2" and further "In the absence of other relevant scales…" But 'at least' doesn't mean 'only'. It is obvious that, as λ1 and λ2 are the coefficients of expansion at 0, there are other terms and, hence, other independent length scales at the interval (0, ∞). Figure 1b clearly demonstrates the idea that the integral is not determined by the behavior at 0, because the contribution of the function tail can be of any value.

   This note doesn't affect the further results of the work, because the authors show that short-length and tail scales must correlate and try to explain why. However, at the stage of Eq. (15) this statement looks ill-founded.

   Let me suggest the idea. As the value of the correlation length ξ is derived from the fitting the correlation function by the exponential at the whole interval, the estimation

$$\int_0^\infty A(r)dr = \xi$$

   looks much more reliable.

   Partially, this implication is confirmed by the fact that, when considering the correlation between ξ, μ_1, and μ_2, the obtained correlation coefficient at μ_2 is higher than that at μ_1.

   (Minor: the differential *dr* is missing in the integral).

3. Page 14, line 25: "In the previous sections we found a statistical relation <…> between the exponential correlation length and the chord length moments on the other hand." I guess the authors wanted to say "between the geometrical scales λ1 and λ2 and the chord length moments," because the relation between the exponential correlation length and the chord length moments is considered just below.

4. Introducing the factor $1-\phi$ into Eq. (24) the authors go back to the length λ1 in the second term by virtue of Eq. (13). This is worth to note. Also, with the factor $1-\phi$ in Eq. (23) the second term turns to μ_1. In the whole, it is worth to underline that λ_1 and μ_1 are always related with

Eq. (13) and indeed μ_1 have the meaning of the optical size, being exactly $\mu_1 = \frac{2}{3} d_{opt}$ independently of the snow density.

5. Page 19, line 18-19. "The results in Malinka (2014) are mainly based on the Laplace transform of an exponential, p(α) = 1/(1+ µ1α), which only involves µ1 (or the optical radius via Eq. 1)." This is not completely true, because the exponential law is considered only as an example, though very important one. I would just delete this sentence, because it doesn't carry important information.

6. Page 19, line 20, table 1: "relative importance αµ2/2µ1 of the second-order term compared to the first-order term in the expansion Eq. (12)." This value doesn't look very informative. I think that much more informative will be the value, proportional to the variance $\alpha(\mu_2 - \mu_1^2)/2\mu_1$, because it will give the deviation from the exponential law.

7. It would be nice to consider these relations taking into account the relationship between $A(r)$ and $p(l)$ in the general case of a dense medium, not restricted by the dilute one.

Reference

P. Switzer, "A random set process in the plane with a Markovian property," *Ann. Math. Statist* **36**, 1859-1863 (1965).