The big problem with this paper is the lack of a clear purpose. After reading it, my main question is: “What does this tell us?”

The authors have introduced a classification scheme for bow shocks/waves and are now fitting existing observations of shells into this scheme. But why? What does this classification scheme give us? How does it help? Perhaps this was explained more clearly in previous papers, but we need to see at least a summary here, because as it is presented now, in this paper, the exercise seems pointless.
For example: In the paper by Cox et al 2012, which the authors cite, a classification scheme was introduced in an attempt to determine the interactions that shape the shell: fast moving star, slow-moving star, stationary star, etc. Similar arguments lay behind various other classification schemes for circumstellar shells that labeled them as bipolar, monopolar, ellipsoid etc. Here that does not seem to be the case. The hot and cold star shells occupy adjacent positions that tend to overlap and the young stars are spread over such a wide area that identification is almost impossible.
Perhaps this kind of differentiation make it possible to determine the nature of the progenitor star based upon a shell’s position within the classification scheme, but is that really useful? Direct observation of the star seems a more effective method.
So, I ask again, what do we gain from this new system and all the work that has gone in to automating the classification process? The authors have made an attempt to draw some conclusions from the way these starts fit within their classification scheme, but the results are either inconclusive or already known. E.g.

- One of the main ‘conclusions’ seems to be that bow shocks of OB stars are highly diverse owing to hydrodynamical instabilities in the shell. True, but that is common knowledge, and has been since the ’90s.
- The ‘young star shells’ are also extremely diverse. Again, not a surprise as they have asymmetrical winds and tend to exist in the highly diverse environment of a stellar nursery. No classification system based on two parameters is going to effectively capture the influence of so many independent variables.

To summarize: In this paper, the authors take previously published observations of bowshock shells and try to classify them with a previously published classification scheme. The results are, by and large, inconclusive. As such, I am unsure whether the paper contains a sufficient amount of original content to warrant publication. Instead it appears to be a lengthy exercise that requires a great deal of effort to re-shuffle existing data without actually achieving something.

There are other issues with this paper as well, but without a clearly defined purpose I cannot fully judge how serious they are. Still, the authors need to look at the following:

- The title is a problem: “Bow shocks, bow waves and dust waves.” Except neither bow waves or dust waves are mentioned anywhere in the text. I understand that the authors see this paper as one in a series, but as it is, the title is deceptive. Are some of the shells discussed in this paper either bow waves or dust waves? If so, that needs to be stated explicitly and discussed. If not, the problem can be fixed at least somewhat by rewriting the extended title to emphasize ‘bowshocks’, rather than the generic ‘shells’.

- Regarding timescales: The authors claim that it is safe to assume that observed bowshocks are fully formed, because the formation time is small compared to the total lifetime, based on Mohammed et al. 2012 and Marle et al. 2014. Although these papers give an indication as to the timescale at which a bowshock forms, this is inevitably going to depend on the interstellar medium density. This is particularly important for stars with a low wind velocity: If they travel through a low density medium, it will take a long time to form the bow shock, simply because it will take a long time for the stellar wind to travel the distance to R_0, let alone reach a hydrodynamical equilibrium. Is that included in the time-estimate?
- Something that does not get mentioned in this paper but may well be of paramount importance is the separation between dust and gas concentrations. The analytical/numerical models of bowshocks predict the morphology of the gas. However, van Marle et al. 2011 (2011ApJ...734L..26V) showed that the dust distribution in space may not follow the gas distribution for a red supergiant bowshock and van Marle et al. 2015 (2015JPhCS.577a2024V) showed something similar for an O-star. This limits the reliability of mid/far infrared continuum observations for tracing bow shocks.
- Another issue that receives no mention in this paper is the influence of the interstellar magnetic field, which can change the shape of the bow shock. Arnal 1992 already discussed the potential influence of interstellar magnetic fields on circumstellar bubbles and it was shown numerically in papers such as van Marle et al. 2014, which the authors quote elsewhere.