Evolution of massive stars with pulsation-driven superwinds during the RSG phase

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Pulsations driven by partial ionization of hydrogen in the envelope are often considered important for driving winds from red supergiants (RSGs). In particular, it has been suggested by some authors that the pulsation growth rate in a RSG can be high enough to trigger an unusually strong wind (or a super-wind), when the luminosity to mass ratio becomes sufficiently large. Using both hydrostatic and hydrodynamic stellar evolution models with initial masses ranging from 15 to 40~Msun, we investigate 1) how the pulsation growth rate depends on the global parameters of supergiant stars, and 2) what would be the consequences of a pulsation-driven super-wind, if it occurred, for the late stages of massive star evolution. We suggest that such a super-wind history
would be marked by a runaway increase, followed by a sudden decrease, of the winds mass loss rate. The impact on the late evolution of massive stars would be substantial, with stars losing a huge fraction of their H-envelope even with a significantly lower initial mass than previously predicted. This might explain the observed lack of Type II-P supernova progenitors having initial
mass higher than about 17~Msun. We also discuss possible implications for a subset of Type IIn supernovae.

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