Mass loss in main-sequence B stars

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We calculate radiatively driven wind models of main-sequence B stars and provide the wind mass-loss rates and terminal velocities. The main-sequence mass-loss rate strongly depends on the stellar effective temperature. For the hottest B stars the mass-loss rate amounts to 10^{-9} Mo/year, while for the cooler ones themass-loss rate is lower by more than three orders of magnitude. Main-sequence B stars with solar abundance and effective temperatures lower than about 15 000 K (later than spectral type B5) do not have any homogeneous line-driven wind. We predict the wind mass-loss rates for the solar chemical composition and for the modified abundance of heavier elements to study the winds of chemically peculiar stars. The mass-loss rate may either increase or decrease with increasing abundance, depending on the importance of the induced emergent flux redistribution. Stars with overabundant silicon may have homogeneous winds even below the solar abundance wind limit at 15 000 K. The winds of main-sequence B stars lie below the static limit, that is, a static atmosphere solution is also possible. This points to an important problem regarding the initiation of these winds. We discuss the implications of our models for rotational braking, filling the magnetosphere of Bp stars, and for chemically peculiar stars.

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