Oscillations of classical Cepheids - new discoveries and new challenges

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Classical Cepheids are excellent standard candles and find numerous applications in astrophysics and cosmology. The recent discoveries point however, that their pulsation is not as simple as commonly believed. Radial mode paradigm no longer holds. Low-amplitude periodic light curve modulation (Blazhko effect) might be a common phenomenon, at least for some ranges of pulsation periods. We will present the recent discoveries and associated theoretical challenges. Space observations of classical Cepheids are crucial to establish the occurrence rates of various new dynamical phenomena and to test the models proposed to explain them. In this context, initial results of the BRITE observations of classical Cepheids will be briefly discussed.