Coping with loss

Stability of mass transfer from post-main-sequence donor stars (Corrigendum)

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In the original article, we used an incorrect MESA code configuration, which affected our results. Specifically, the use_radiation_corrected_transfer_rate setting in MESA, which is enabled by default, was not turned off during our simulations. This setting is designed to treat the accreting star as a black hole, applying corrections to the amount of mass accreted in order to account for the mass energy that would be radiated away as accretion luminosity. As a result, mass transfer was not fully conservative as was intended.

A portion of the transferred mass is effectively lost from the system, and the actual mass-transfer efficiency is between 62.5% and 99% at the end of the calculations. Likewise, the orbital evolution is affected by the loss of angular momentum associated with the lost mass, though the effect on the orbit and mass-transfer rate is minimal (see Fig. 1 for a representative example). The amount of erroneously lost mass from a binary system grows over time. Hence, the impact is smallest for those binary systems where only a relatively small amount of mass is

Fig. 1. Comparison of the stable mass-transfer phase of a binary system calculated with the settings of the original article (marked ‘CWL’) and a truly conservative calculation. The initial conditions are identical: an initially 4 $M_\odot$ donor star with a radius equal to 12.7 $R_\odot$ loses mass to an initially 1.2 $M_\odot$ point-mass companion. In the top panel, the solid lines show the mass-transfer rate, whilst the dotted lines show the orbital period, corresponding to the right vertical axis.

Fig. 2. Comparison between the previously reported values for $q_{\text{ad}} \equiv \frac{M_a}{M_d}$ (in black) and the corrected set (in green). Shading around the lines represents the uncertainty on $q_{\text{ad}}$ due to the spacing of our grid.

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transferred before the instability (for a visualisation, compare the two calculations around the maximum mass-transfer rate near $M_d = 3.1 \, M_\odot$ in Fig. 1). For stable mass-transfer systems such as the one shown in Fig. 1, the impact is mainly on the final mass of the accretor; the final donor mass and orbital period are hardly affected.

We re-simulated a subset of our grid with the correct setting to obtain the values of the critical mass ratio, $q_{\text{ad}}$, for stable mass transfer in a truly conservative setting. The impact on $q_{\text{ad}}$ is minimal (see Fig. 2), and the conclusions of the original article remain unchanged. We expect a similarly small impact on the values of $q_{\text{dyn}}$ and $q_{\text{LOF}}$ (the critical mass ratios for dynamical-timescale evolution and outer lobe overflow, respectively), as the effect on the mass-transfer rates and donor over-extension past the Roche lobe is small in all the recomputed systems.

**Data availability**

We have updated our main results table (Table B2) to include the correct values for the critical mass ratios. This is available at the CDS via anonymous ftp to cdsarc.cds.unistra.fr (130.79.128.5) or via https://cdsarc.cds.unistra.fr/viz-bin/cat/J/A+A/669/A45. The necessary correction to the MESA inlists has been added to the Zenodo record (https://zenodo.org/records/7937496). All corrected files are also available upon reasonable request to the corresponding author.