

Advanced Morphological Galaxy Classification: A Comparison of Real and Simulated Galaxies

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(Submitted on 29 Jul 2011 (v1), last revised 31 Oct 2011 (this version, v2))

Encoded within the morphological structure of galaxies are clues related to their formation and evolutionary history. Recent advances pertaining to the statistics of galaxy morphology include sophisticated measures of concentration (C), asymmetry (A), and clumpiness (S). In this study, these three parameters (CAS) have been applied to a suite of simulated galaxies and compared with observational results inferred from a sample of nearby galaxies. The simulations span a range of late-type systems, with masses between $\sim 1e10$ Msun and $\sim 1e12$ Msun, and employ star formation density thresholds between 0.1 cm^{-3} and 100 cm^{-3} . We have found that the simulated galaxies possess comparable concentrations to their real counterparts. However, the results of the CAS analysis revealed that the simulated galaxies are generally more asymmetric, and that the range of clumpiness values extends beyond the range of those observed. Strong correlations were obtained between the three CAS parameters and colour (B-V), consistent with observed galaxies. Furthermore, the simulated galaxies possess strong links between their CAS parameters and Hubble type, mostly in-line with their real counterparts.

Comments: Accepted for publication in MNRAS; 11 pages; 12 figures; replacement includes minor amendments to match the published version

Subjects: **Cosmology and Extragalactic Astrophysics (astro-ph.CO)**; Galaxy Astrophysics (astro-ph.GA)

Cite as: [arXiv:1107.6045](https://arxiv.org/abs/1107.6045) [astro-ph.CO]
(or [arXiv:1107.6045v2](https://arxiv.org/abs/1107.6045v2) [astro-ph.CO] for this version)

Submission history

From: Brad Gibson [[view email](#)]

[v1] Fri, 29 Jul 2011 19:59:00 GMT (5292kb)

[v2] Mon, 31 Oct 2011 14:05:03 GMT (5291kb)

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