# Sim2Real Resources and References

## Core Survey Papers and Workshops

1. **https://arxiv.org/abs/2009.13303**
   Comprehensive survey on sim-to-real transfer in deep reinforcement learning for robotics. Essential reading for understanding the field's foundations.

2. **https://sim2real.github.io/**
   3rd Workshop on Closing the Reality Gap in Sim2Real Transfer for Robotics (RSS 2022). Major academic workshop bringing together leading researchers.

3. **https://www.researchgate.net/publication/346701542_Perspectives_on_Sim2Real_Trans**
   Summary of perspectives from the RSS 2020 workshop on sim2real transfer challenges and solutions.

## MuJoCo Resources

4. **https://mujoco.readthedocs.io/en/3.0.0/mjx.html**
   Official documentation for MuJoCo XLA (MJX), the GPU-accelerated version enabling massive parallelization for domain randomization.

5. **https://mujoco.readthedocs.io/en/stable/mjx.html**
   Stable version documentation for MJX implementation and usage.

6. **https://arxiv.org/html/2502.08844v1**
   MuJoCo Playground paper - introduces the modern framework for simplified sim2real transfer.

7. **https://playground.mujoco.org/**
   Official MuJoCo Playground website - interactive demos and examples.

8. **https://mujoco.readthedocs.io/en/latest/modeling.html**
   MuJoCo modeling guide - essential for understanding physics parameter configuration.

9. **https://github.com/google-deepmind/mujoco**
   Main MuJoCo repository from DeepMind with source code and examples.

## Advanced Techniques and Methods

10. **https://arxiv.org/abs/2406.01967**
    DrEureka paper - LLM-guided sim-to-real transfer, automating reward design and domain randomization.

11. **https://arxiv.org/abs/2403.12193**
    Continual Domain Randomization - progressive parameter addition using continual learning.

12. **https://proceedings.mlr.press/v155/sandha21a.html**
    Sim2Real transfer with stochastic state transition delays - addresses timing discrepancies.

13. **https://openai.com/research/solving-rubiks-cube**
    OpenAI's Rubik's Cube robot - landmark achievement in sim2real with extensive domain randomization.

14. **https://arxiv.org/abs/2405.10315**
    TRANSIC framework - learning from online correction for improved transfer (77% success rate).

15. **https://arxiv.org/abs/2206.02679**
    Real2Sim vs Sim2Real comparison for robotic visual insertion tasks.

16. **https://arxiv.org/abs/2503.01255**
    Impact of static friction on sim2real - highlights often-overlooked friction modeling.

## Domain Randomization Resources

17. **https://lilianweng.github.io/posts/2019-05-05-domain-randomization/**
    Lilian Weng's comprehensive blog post on domain randomization techniques and theory.

18. **https://danieltakeshi.github.io/2019/08/18/domain-randomization/**
    Practical domain randomization tips from Berkeley researcher.

19. **https://arxiv.org/abs/1703.06907**
    Original domain randomization paper from OpenAI - foundational work.

20. **https://github.com/montrealrobotics/domain-randomizer**
    Standalone library for randomizing OpenAI Gym environments.

## System Identification Papers

21. **https://ieeexplore.ieee.org/document/8772145/**
    Dynamic identification of Franka Emika Panda robot with feasible parameter retrieval.

22. **https://www.sciencedirect.com/science/article/abs/pii/S0736584510000232**
    Overview of dynamic parameter identification techniques for robots.

23. **https://www.cambridge.org/core/journals/robotica/article/electromechanical-modeling-and-identification-of-the-ur5-eseries-robot/1AE5BAE866D9046F79C4B159BEA2**
    UR5 robot electro-mechanical modeling and identification methodology.

24. **https://www.mdpi.com/2218-6581/10/1/49**
    Dynamic and friction parameters identification for industrial robots with repetitiveness analysis.

## Evaluation Metrics and Benchmarks

25. **https://arxiv.org/abs/1912.06321**
    Sim2Real Predictivity paper - introduces SRCC metric for evaluating simulation-reality correlation.

26. **https://2025.ieee-icra.org/event/the-4th-robotic-sim2real-challenges/**
    ICRA 2025 Sim2Real Challenges - annual competition and benchmarking event.

27. **https://arxiv.org/abs/2506.17675**
    Quantification of sim2real gap via neural simulation gap function - theoretical framework.

## Practical Implementation Resources

28. **https://www.mdpi.com/2075-1702/12/10/682**
    Curriculum design and sim2real transfer for dual-arm robotic assembly - practical case study.

29. **https://robosuite.ai/docs/algorithms/sim2real.html**
    robosuite documentation on sim-to-real transfer implementation.

30. **https://github.com/unitreerobotics/unitree_mujoco**
    Unitree robots MuJoCo integration - example of platform-specific implementation.

31. **https://github.com/robotlearning123/awesome-isaac-gym**
    Curated list of NVIDIA Isaac Gym resources for sim2real applications.

## Related Technologies and Tools

32. **https://developer.nvidia.com/blog/closing-the-sim2real-gap-with-nvidia-isaac-sim-and-nvidia-isaac-replicator/**
    NVIDIA's approach to closing sim2real gap with Isaac Sim platform.

33. **https://github.com/google/brax**
    Brax - Google's massively parallel physics simulation for RL training.

34. **https://news.mit.edu/2024/precision-home-robotics-real-sim-real-0731**
    MIT's real-to-sim-to-real approach for home robotics applications.

35. **https://arxiv.org/abs/2409.20291**
    RL-GSBridge - 3D Gaussian Splatting integration for realistic sim2real transfer.

## Community Resources and Tutorials

36. **https://sim2realai.github.io/welcome-to-sim2real-AI/**
    sim2RealAI community portal with tutorials and resources.

37. **https://www.haonanyu.blog/post/sim2real/**
    Three-part blog series on sim2real transfer in robotics - practical insights.

38. **https://www.roboticscareer.org/news-and-events/news/23603**
    Introduction to sim2real learning for robotics careers.

39. **https://atimotors.com/blog/sim2real-bridging-the-gap-between-simulation-and-reality/**
    Industry perspective on sim2real challenges and solutions.

## Research Papers on Specific Techniques

40. **https://www.mdpi.com/2076-3417/14/21/9710**
    Balanced Domain Randomization for safe reinforcement learning - addresses rare scenario coverage.

41. **https://www.frontiersin.org/articles/10.3389/frobt.2022.799893/full**
    Comprehensive review of robot learning from randomized simulations.

42. **https://blog.research.google/2021/06/toward-generalized-sim-to-real-transfer.html**
    Google Research blog on generalized sim-to-real transfer approaches.

43. **https://didyouknowbg8.wordpress.com/2024/05/12/dreureka-revolutionizing-robot-learning-with-llms/**
    Blog post explaining DrEureka's LLM-guided approach to sim2real.

## Platform-Specific Resources

44. **https://github.com/frankaemika/franka_ros/issues/143**
    Discussion on physics parameters for Franka Panda robot in simulation.

45. **https://arxiv.org/abs/2209.00274**
    mc-mujoco - simulating articulated robots with FSM controllers in MuJoCo.

46. **https://www.mdpi.com/2076-3417/13/19/10631**
    High-fidelity drone simulation with depth camera noise modeling.

## Development Tools and Frameworks

47. **https://publica.fraunhofer.de/entities/publication/5ce1f69e-d58e-4b67-a06f-7ce97a3da45f**
    Development of toolchain for robust sim2real transfer of learning-based applications.

48. **https://roboticsknowledgebase.com/wiki/robotics-project-guide/choose-a-sim/**
Guide for choosing appropriate simulators for robotics projects.

49. **https://www.researchgate.net/publication/307914416_ROSunity_An_efficient_high-fidelity_3D_multi-UAV_navigation_and_control_simulator_in_GPS-denied_environments**
ROS+Unity integration for UAV simulation in GPS-denied environments.

## Additional Academic Resources

50. **https://vcresearch.berkeley.edu/faculty/pieter-abbeel**
Pieter Abbeel's research page - leading researcher in robot learning and sim2real.

51. **https://www.emergentmind.com/papers/2405.10315**
TRANSIC paper on emergentmind - alternative source for the online correction framework.

52. **https://arxiv.org/abs/2207.06572**
i-Sim2Real - RL in tight human-robot interaction loops.

These resources provide a comprehensive foundation for understanding and implementing sim2real transfer in robotics, from theoretical foundations to practical implementation tools and state-of-the-art research developments.