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3D investigation of dynamic behavior and sensitivity analysis of the parameters of spherical biological particles in the first phase of AFM-based manipulations with the consideration of humidity effect

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Highlights

- The 3D modeling of the manipulation of spherical biological micro/nanoparticles have been performed by considering the humidity effect.
- The motion modes have been derived from the constructed 3D models, and the maximum cantilever tip radius for the manipulation of a spherical bioparticle has been determined.
- The effective parameters have been identified by using the Sobol method.
- Compared to the results obtained for a dry environment, in a wet environment, the critical force for the onset of particle movement diminishes by considering the moisture effect (high humidity levels).
- Particle radius and adhesion coefficient are the most significant and influential parameters.

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