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Squeeze Film Damping in the Limit of High Frequency MATTHEW SULLIVAN, Harvard University and Schlumberger-Doll Research, ANTOINE FORNARI, PHILIP DRYDEN, HUA CHEN, Schlumberger-Doll Research, KAI HSU, Sugar Land Product Center, Schlumberger Oilfield Services, FREDRIC MARTY, BRUNO MERCIER, Ecole Supérieure d'Ingénieurs en Electronique et Electrotechnique, CHRISTOPHER HARRISON, Schlumberger-Doll Research — We present experimental evidence that the drag associated with squeeze film damping in the inertia-dominated regime scales like the inverse cube of the gap. The experiments were performed by measuring the resonant spectrum of vibrating plates fabricated with Micro Electro Mechanical Systems (MEMS) technology and studying their mechanical properties in near proximity to a wall. The resonant frequency and quality factor were measured from which the real and imaginary portions of the drag were calculated. By modeling the system as a simple harmonic oscillator with complex drag it was found that the inertial component dominated for $h > R$ and that the drag scaled as R^3/h^3, where R and h correspond to the effective plate radius and the gap respectively. In this regime the plate can be modeled with steady potential dipoles which have a pressure field that decays in the same manner with distance.

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