Abstracts

A study of thermal effects in RF-MEM-switches using a time domain approach

W. Thiel, K. Tornquist, R. Reano and L.P.B. Katehi. "A study of thermal effects in RF-MEM-switches using a time domain approach." 2002 MTT-S International Microwave Symposium Digest 02.1 (2002 Vol. I [MWSYM]): 235-238 vol.1.

A thermal analysis of RF-MEM-switches based on the heat conduction is presented. The heat equation Is solved by employing a Forward Time Centered Space (FTCS) difference scheme. For the electromagnetic (EM) characterization, the standard FDTD method is used which provides the dissipated RF power in the MEMS metal structure for a subsequent separate heat analysis. The computed temperature distribution In the switch was utilized as an input to a mechanical simulator for a mechanical analysis. This analysis has shown that when the MEMS switch operates under high power, a temperature gradient develops on the structure that strongly affects stress distribution on the switch. This stress redistribution impacts operation and affects switch lifetime. The accuracy of the presented method is demonstrated by comparing the theoretically computed and experimentally verified thermal profile of a patch antenna.

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