Figure 1: Schematic representation of the non-linear electrostatic transducer with two outputs.

Figure 2: (a) Bifurcation graph showing periodic, quasiperiodic and chaotic regions over the segment of $U_0$. (b) Corresponding change of the largest Lyapunov exponent. $\lambda_1 = 0.01$, $\gamma = 0.101$, $\mu_1 = \mu_2 = 0.434$, $\lambda_2 = \lambda_3 = 0.08$, $\omega_1 = \omega_2 = 1$, $\alpha_1 = \alpha_2 = 0.06$, $\omega = 1.64$
Figure 3: (a) Basin of attraction for the chaotic motion in the parameter space \((U_0, \gamma)\) and (b) \((U_0, \omega_1 = \omega_2)\). The parameters are those of Fig. 2.

Figure 4: Phase portrait of the chaotic motion for \(U_0 = 9.5\). The other parameters are those of Fig. 2.
Figure 5: The electromechanical transducer.

Figure 6: Analytical and numerical limit cycle Amplitude response-curves $A(\gamma_1)$. The parameters are given in the text.
Figure 7: Phase portraits of the electromechanical system without feedback couplings. The parameters are provided in the text.

Figure 8: Time evolution of the synchronization error. (a) $e_1 = y_1 - x_1$, (b) $e_2 = y_2 - x_2$, (c) $e_3 = y_3 - x_3$ and (d) $e_4 = y_4 - x_4$. 
Figure 9: Relation between the drive and response systems: without coupling terms (a)-(d) and with coupling terms (e)-(h).
Figure 10: Power spectrum of (a) $x_1$, (b) $x_2$, (c) $x_3$, (d) $x_4$ and (e) $y_1$, (f) $y_2$, (h) $y_3$, (h) $y_4$ under control actions.
Figure 11: Time evolution of the adaptive parameter $\alpha$. 