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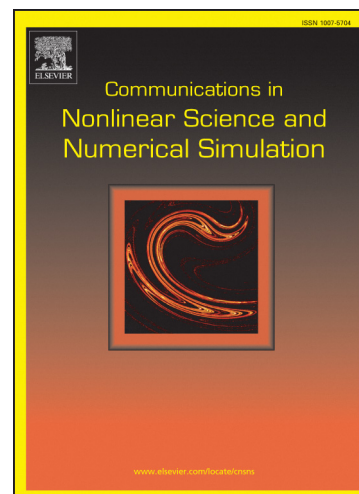
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Nonlinear dynamics and global analysis of a
heterogeneous Cournot duopoly with a Local
Monopolistic Approach versus a Gradient Rule with
endogenous reactivity

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Abstract

We study a heterogeneous duopolistic Cournotian game, in which the firms, producing a homogeneous good, have reduced rationality and respectively adopt a “Local Monopolistic Approximation” (LMA) and a gradient-based approach with endogenous reactivity, in an economy characterized by isoelastic demand function and linear total costs. We give conditions on reactivity and marginal costs under which the solution converges to the Cournot-Nash equilibrium. Moreover, we compare the stability regions of the proposed oligopoly to a similar one, in which the LMA firm is replaced by a best response firm, which is more rational than the LMA firm. We show that, depending on costs ratio, the equilibrium can lose its stability in two different ways, through both a flip and a Neimark-Sacker bifurcation. We show that the nonlinear, noninvertible map describing the model can give rise to several coexisting stable attractors (*multi-stability*). We analytically investigate the shape of the basins of attractions, in particular proving the existence of regions known in the literature as *lobes*.

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