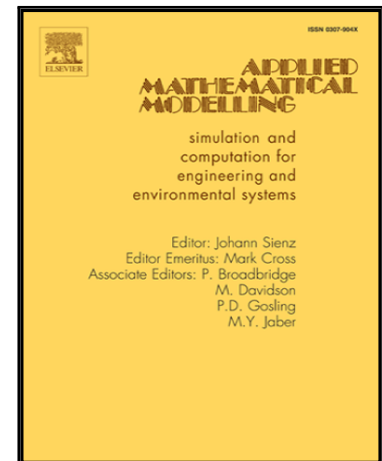


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Mutualisms in a parasitism-predation system consisting of crows, cuckoos and cats

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Highlights

- The crow-cuckoo-cat system consisting of parasitism, predation and mutualism, is modeled.
- The crow-cuckoo interaction can change among parasitism, commensalism, mutualism and neutralism.
- When predation from cat is weak, cuckoo has a small positive effect on crows and their interaction is parasitism.
- When the predation is intermediate, the positive effect becomes large and the interaction is mutualism.
- Periodic oscillations of the population may occur in certain range of the parameters.

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