Root-finding numerical methods such as newtons method are used for solving systems of differential equations. This consequetnly means that root finding methods are used in many applications where systems of differential equaitons are used. Examples include modeling heat transfer in a material, modeling predator verses prey population relationships in an ecosystem, or modeling fluid flow.

http://www.personal.psu.edu/sxt104/class/Math251/Notes-Predator-Prey.pdf

http://adsabs.harvard.edu/abs/1994IJNMF..19...41L

https://www.tandfonline.com/doi/abs/10.1080/10407790802182687?journalCode=unhb20