

# EPIDEMIC PATTERNS OF EMERGING VARIANTS

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Motivated by the emergence of new variants during the COVID-19 pandemic, we consider an epidemiological model of disease transmission dynamics, where by mutation novel strains of a virus appear. In the model, disease prevalence is modulated by social distancing. We study the different patterns that are generated under different assumptions. If recovery from a given strain gives immunity against all previous strains, but not against more novel strains, then we observe a very regular sequential pattern of strain replacement where newer strains gain dominance, and their waves are increasingly wider. However, if protection upon recovery holds only against that particular strain, we find a much more complicated dynamics with potential recurrence of earlier strains, and co-circulation of various strains. Finally, we compare the observed patterns with what we have seen during COVID-19.

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- [2] MASSARD, MATHILDE AND EFTIMIE, RALUCA AND PERASSO, ANTOINE AND SAUSSEREAU, BRUNO, *A multi-strain epidemic model for COVID-19 with infected and asymptomatic cases: Application to French data*, Journal of Theoretical Biology, Elsevier, 2022.