



FIG. 5 Sensitivity analysis with a 30% variation in λ_{EK} . The left graphs present the primary case and the right graphs demonstrate the reactivation case. Top graphs are sensitivity analysis for the susceptible cells (S) in primary and reactivation cases. The second and third rows depict the infected cells and viruses, respectively. The lower graphs demonstrate the variation of the control signal (ϵ) in primary (*left*) and reactivation (*right*) cases. *Solid lines* are original values, *dashed lines* in the third row are viral threshold values, *dot-dashed lines* are values for 30% increment in λ_{EK} , and *dotted lines* are values for 30% decrement in λ_{EK} .

Finally, Fig. 10 illustrates the results obtained for a 10% alternation in κ_{EK} . A high increase in the viral loads (V) and infected cells (I) is observed after a 10% increment, and the viral load in primary and reactivation cases came above its threshold. In contrast, in a 10% reduction of κ_{EK} , the viral load never reached its threshold in neither primary nor reactivation infection.

4.5. Possible Antiviral Therapy Strategies

Pre-emptive therapy and universal prophylaxis have been recognized as two main global preventive strategies to treat the HCMV viral load and prevent kidney diseases after its transplantation. According to [43], pre-emptive

therapy should be started when the CMV DNA copies are exceeded from their defined threshold, and this therapy should be continued until the CMV level drops below the detection limit. Universal prophylaxis is also started usually ten days after kidney transplantation. However, there are side effects in both of these treatment strategies, such as risks of getting leukopenia, anemia, thrombocytopenia, nephrotoxicity and cytopenias [44]. In a long-term study [45], after seven years of a clinical trial to compare the prophylaxis and the pre-emptive therapies, results showed that although both strategies were useful, the prophylaxis showed more effectiveness and better performance in preventing CMV infection or kidney disease.