More about video3
We are able to track the ball with a high accuracy before the pivot point, but even after the sharpe change of the velocity our algorithm tracks general movement of the ball. The particular problem of this video is in this dramatic change of velocity which is hard to adapt to from the A matrix. We should increase the level of noise of the speed, at the same time this will make tracking on "easier" parts more unstable

Final questions:

Number of particles
The more is the number of particles, the more is stability of the tracking due to better statistical approximation and less probability of random, but significant detrimental changes (liquidation of the most appropriate particles. The disadvantage is that more particles need more computational power and memory.

Number of bins
Here the balance should be done between accuracy of the presentation of the continuous color histogram by using discrete on the one side, and the influence of noise, because when we calculate chi-measure, we compare correspondent bins, and the size of them shouldn't be less than noise, otherwise the same color points will come to different bins and it will decrease calculated similarity of the histograms, reducing the quality of this measure.

Advantages/disadvantages of changing the appearance model
Change of the model due to introducing of artificial noise could be beneficial, because these static and linear velocity models can't describe the whole range of possible movements of the object, but noise allows to effectively change the model from frame to frame resulting in better approximation, because we always compare prediction with observation and softly adapt to the new type of movement. But here the balance with noise still should be done, because otherwise even a little perturbation will change our model drastically, at the same time the true movement stays almost the same, resulting in discrepancies and further shift between these two.

(Excuse me for this form of report, I wasn' able to add these answers to the LaTeX version due to technical reasons)