**Proof of a Lemma in presentation 10-07-2019**

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Lemma: If is a Next-Capture Point, then is also a Next-Capture Point.

Proof: If is a Next-Capture Point, then exists functions holding:

With:

Index represents the contact.

In particular, holds:

Now, we will place the last contact () in: We have defined:

We are going to apply the same forces and torques to the contacts (and we are allowed because Contact Wrench Cone does not change under assumption of same assuming fixed normal vector and friction). Note that the trajectories of and don’t change, because their dynamics are not affected by the placement of . Subindex is for “new system” (with the same initial conditions).

We have:

Finally, the variable holds**:**

So we have **,** and so the point is also a Next-Capture Point.