FSMPU – The FSMP User Guide

"hi i have new issue with FSMP - Faster HDT-SMP with capes and cloaks duzint work at all and they and other HTP-SMP can u fix that probelm it not wind issue and capes stay like this [redacted] and shud work like this [redacted] and any ideas how FSMP - Faster HDT-SMP"

-- A real user this week requesting help by nexus private message –

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Preliminaries

Foreword

At the time I write these lines, FSMP has had 625.526 (update: 914,933) unique downloads since the 21st October 2021, which should mean 625.526 (update: 1,016,190) unique users in 1.5 (update: 2!) years.

Thank you 😊!

However, this has brought some very specific challenges, for example how to maintain a useful and up-to-date knowledge base in a thriving and diverse community.

This User guide aims to try and solve some of these challenges.

I hope to update it each time I see a way to save my time and your time.

The Hall of Fame

Oh my! How many people to credit and thank!

The SKSE team

hydrogensaysHDT

aers

ousnius

karonar1

alandtse

geniusty

hsanmartin

skullgirls

daydreamingday

idaan300

romanicles

igloomod

sesamepaste

jg1

antpillager

acro

webspam

Those are people who have contributed to code and build, please regard them as nice people to thank and not bother ^^

Some people have earned a special place in my heart during this adventure:

- *Alandtse, for his invaluable support and advices*
- *Snotty and smartco, for their charming friendship*
- *Sermit, Wodo and WhoNoze, for their selfless help*
- *Jg1, Webspam and Acro, for their amazing contributions*
- *Aisling, for his confidence in me and his unconditional support since the beginning*

I may have forgotten people. If you find so, please kindly inform me, I'll fix it.

Changelog

I don't think I'll do a very detailed changelog. If you really need one, please explain me why 😊

1.0.0: Initial version

1.1.0: Added

1. the console commands,
2. the section on what FSMP does and doesn't do,
3. the "About CUDA" section,
4. the Congratulations section.

1.2.0: Added

1. the mistakenly forgotten ousnius in the credits, kudos to him!
2. The "how to update config quickly" section
3. The definition of the actor states in the "smp list" and "smp detail" console commands.
4. Auto determination of the Skyrim version
5. FSMPM – The FSMP MCM
6. PrivateProfileRedirector SE - Faster game start (INI file cacher)

1.3.0: Added

1. Fixing the jittering on BHUNP

1.4.0: Updated

1. Updated the compilation howto for 1.6.1130

1.5.0: Updated

1. Updated the compilation howto for 1.6.1170

1.6.0: Updated

1. Updated the compilation howto for Skyrim GOG 1.6.1179

What does FSMP do?

FSMP allows to apply advanced physics on actors via xml settings files.

In computer terms, it is a skse plugin using a physics library, Bullet, to calculate moves to apply on Skyrim meshes belonging to actors, depending on xml settings files.

FSMP is highly configurable, specifically concerning its performance.

What it doesn't do:

It doesn't provide any xml physics configuration file.

It doesn't know the difference between a cape and a breast.

It's only an engine, the specific physics settings are set in each mod, depending on the provided meshes, and provided in xml files.

Basically, if you have a problem that happens only on one armor, or one hair, etc, it's very probably related to that mod and not to FSMP.

Let's build confidence

You can install, reinstall, uninstall FSMP whenever you wish, however you wish, there is no risk for your save file or your load order.

The worse that can happen is your (N)PC have grotesque deformations until you install the correct version.

Exception: never ever install the 1.37 version, it's cursed and will destroy your save. I have hidden it and we are currently at the 2.+ version, so you shouldn't even have the opportunity to do so.

There have been different ways to manage HDT-SMP

Now, there is only one, you can pass this section if it doesn't interest you 😊

FSMP – Faster HDT-SMP

It has been forked of Karonar1's source code, and has reintegrated Alandtse source code for VR.

- Original upload: 22 October 2021
- For 1.5.97, VR, 1.6.353, 1.6.640, 1.6.659 (GOG)
- Nexus link: https://www.nexusmods.com/skyrimspecialedition/mods/57339
- Github repository: https://github.com/DaymareOn/hdtSMP64

Alandtse source code for VR

Alandtse's code, forked of Karonar1's code.

- Github repository: https://github.com/alandtse/hdtSMP64

Karonar1 source code

Karonar1's code, forked of aers's.

- Last improvement: 1st June 2021
- Github repository: https://github.com/Karonar1/hdtSMP64

HDT-SMP (Skinned Mesh Physics)

Aers's excellent mod, forked of hydrogensaysHDT source code.

- Original upload: 08 December 2019
- For 1.5.97, VR
- Nexus link: https://www.nexusmods.com/skyrimspecialedition/mods/30872
- Github repository: https://github.com/aers/hdtSMP64

hydrogensaysHDT source code

He is the original author.

- Github repository: https://github.com/HydrogensaysHDT/hdt-skyrimse-mods

Easy wind

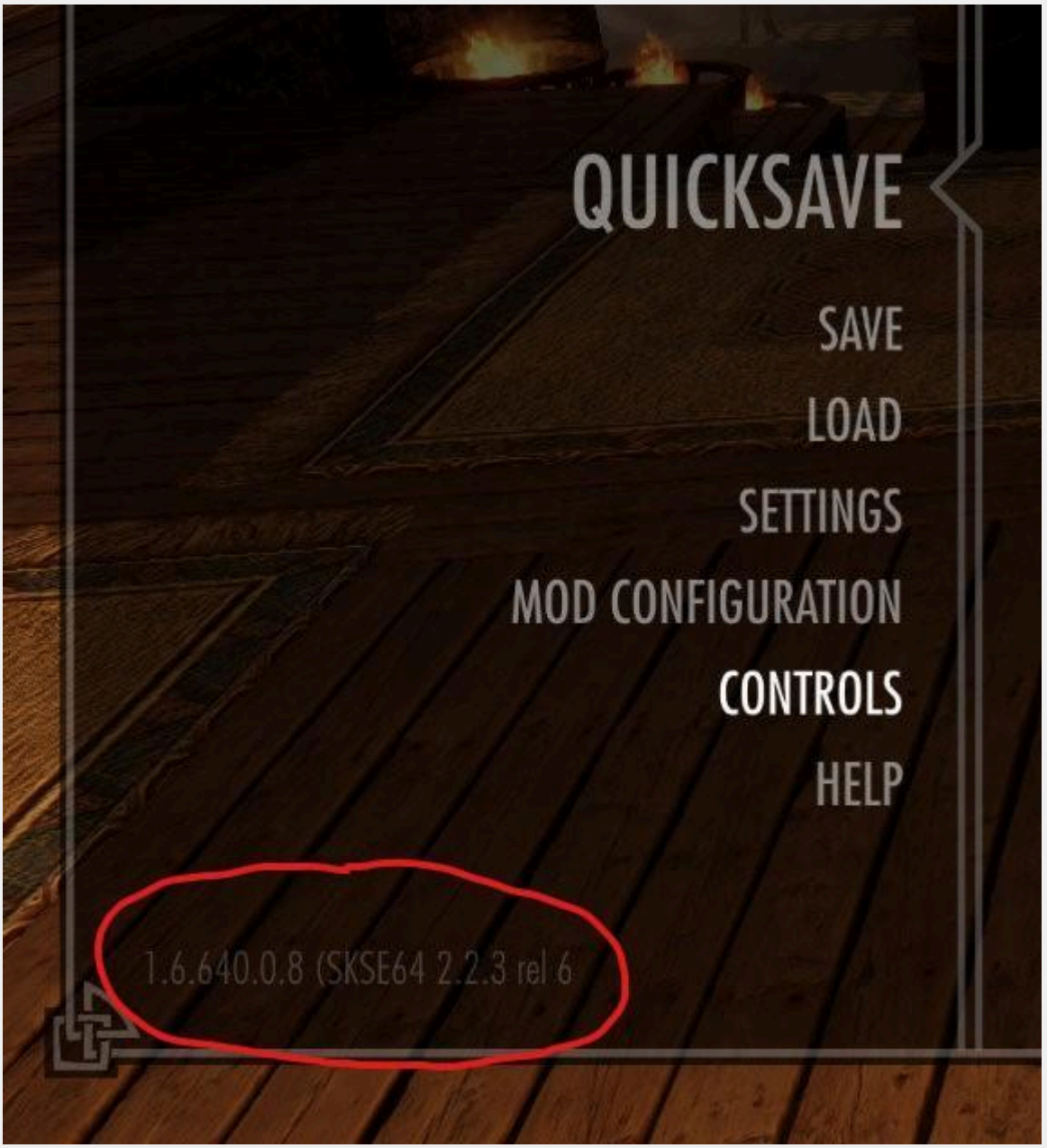
It is a repackaging by yours truly of HDT SMP Wind which has been built from unavailable source code forked from aers code by nexusid1234.

- Nexus link: https://www.nexusmods.com/skyrimspecialedition/mods/57270
- HDT SMP Wind Nexus link: https://www.nexusmods.com/skyrimspecialedition/mods/31936

Installation

Requirements

You need first to know your real Skyrim version, for this, start Skyrim and look here at the bottom left:



- SKSE. Install the latest SKSE for this Skyrim version.
- SMP-NPC crash fix. Mandatory for Skyrim 1.6+
- XP32 Maximum Skeleton Special Extended – XPMSSE.
- Crash Logger SSE AE VR - PDB support. Absolutely install the pdb related to your Skyrim version too.
- FSMPM – The FSMPM MCM.
- FSMPV - HDT-SMP XML Schema. Optional – if you want to check your xml physics files, or the ones of a specific mod, for example for a just released mod.

- Free FPS. Before complaining about SMP performance, improve your setup with this guide by yours truly :)

Recommended mods

Clean up the physics outfit - Collision reset
https://www.nexusmods.com/skyrimspecialedition/mods/86845

Physics outfits are essential elements that add life to Skyrim. However, one inconvenience is that physics can break after dynamic movement. So this mod was born to solve it immersively.

Thanks to skypia :)

Dynamic HDT - Papyrus Script Extension for Faster HDT-SMP
https://www.nexusmods.com/skyrimspecialedition/mods/63017

To be able to change the physics configuration at runtime, through papyrus

Thanks to SesamePaste :)

CC Bone Colossus Skeleton Fix
https://www.nexusmods.com/skyrimspecialedition/mods/63167

To solve the infamous colossus bone bug

Thanks to Yanjding :)

HDT-SMP Force Fields
https://www.nexusmods.com/skyrimspecialedition/mods/79899

Allows spells and effects to interact with HDT-SMP. Fireballs will not only send cheese wedges flying, but also mess up your hair. Immersion!

Thanks to jg1 :)

SMP Wind
https://www.nexusmods.com/skyrimspecialedition/mods/76776

Another implementation of wind.

Thanks to jg1 :)

FAQ - Frequently Asked Questions

Q: What Skyrim versions are supported?

- VR (Steam)
- 1.5.97 (Steam)
- 1.6.353 (Steam)
- 1.6.640 (Steam)
- 1.6.659 (GOG)

Q: What is AVX?

A: Advanced_Vector_Extensions are extensions to the instruction sets for microprocessors from AMD and Intel. All Intel CPUs starting with Sandy Bridge in 2011 and AMD processors on their "Bulldozer" architecture and beyond offer this set of instructions.

Three versions exist: AVX, AVX2 and AVX512.

Q: How do I know if my CPU supports AVX, and if so, which AVX?

A: https://www.quora.com/How-can-I-determine-if-my-CPU-supports-AVX-instructions

Q: What is CUDA?

A: CUDA is a NVidia API enabling general purpose processing on the GPU. Useful when the GPU is powerful, the calculus are adapted for GPU, and the transfers between the CPU and GPU minimal.

Q: How do I know if my GPU supports CUDA?

A: AMD GPU don't support CUDA, see here which NVidia GPU support CUDA.

Q: is there another CPU instruction set that I should be aware of?

A: Yes, your CPU must support the SSE 4.1 cpu instruction set.

Q: What is Bullet? Do I need to install anything Bullet?

A: Bullet is a physics library enabling to do physics collision calculus, among other physics calculus. You don't need to install the Bullet library.

Q: Does this need the previous version of HDT-SMP?

A: This is a replacer for HDT-SMP. This totally replaces the previous version of HDT-SMP. You don't need HDT-SMP.

Q: How can I have better performance?

A: Those below are suggestions, be smart about them, and report your own tips :)

a) configure this mod with the FSMP MCM,

b) Free FPS (shameless promotion, since I'm the author too).

c) write your own hdt smp xml files: here is treota's Guide to HDT-SMP Users/Modders, and here is FSMP-Validator in which there is the hdtSMP64.xsd file where you can find exactly all I know about the smp xml.

Q: What is the difference between the configs.xml file and the other HDT-SMP xml files?
A: The configs.xml file configure the functions provided by the physics engine (of the dll provided by this mod, exactly), the other xml files declare which bones, which collisions, the precise values of bouncing, collisions, etc.

Q: HDT-SMP or CBPC?
A: I used both, and endorsed gratefully CBPC. CBPC description page is enlightening.

Q: Can we include wind?
A: It's included from 1.49.0 version, and jg1 provided another implementation in SMP Wind.

Easy Wind and this mod won't be mergeable as long as nexusid1234's source code for wind isn't available, or he merges them himself, or somebody reimplements it from the articles he wrote. Easy wind and this mod are totally incompatible, the last one loaded wins.

Q: This mod generates bugs or CTDs, what can I do?
A: Report the bugs. You may even solve them :)

Q: I'd like to see the code, compile myself, add functionalities, etc.
A: You can. See the part on compilation.

Installing FSMP

- Install the requirements.
- Take the latest version on the Nexus. The previous versions aren't supported.
- Install it through a mod manager. The manual install isn't supported.
- Your skyrim version is automagically detected, always. You can't change it. If your version isn't supported yet, it isn't supported yet.
- For a first install, choose AVX, No-CUDA, Release, Extreme performance configuration.
- If you have a problem, reinstall with the No-AVX version. Solve your problem.
- Optional: once you have a stable setup with FSMP working great, improve your performance by testing:
    - If, for you, upgrading AVX gives you more fps; it depends on your own very specific setup, so don't ask, and test by yourself;
    - If, for you, upgrading to CUDA gives you more fps; it depends on your own very specific setup, so don't ask, and test by yourself.
    - Once you have a setup working great, improve your quality & performance by testing it with the FSMP MCM. Make sure it
        - improves visibly the simulation quality (it depends on your own very specific setup, so don't ask, and test by yourself; it's no use to improve the quality configuration if you can't perceive it);
        - doesn't lower the performance under what you're willing to accept. Test in a small room (no NPC, high fps) and in a crowded city (it depends on your own very specific setup, so don't ask, and test by yourself; it's no use to improve the quality configuration if you don't like the fps loss).

Configuration

How to quickly modify configs.xml

Use the FSMP MCM 😊

You modified xml will need a Skyrim restart to be taken into account if PrivateProfileRedirector SE - Faster game start (INI file cacher) is installed, so disable it while you're configuring FSMP.

If you'd rather not use the MCM:

It is MANDATORY to adapt FSMP to your setup by configuring the configs.xml file.

This file is in Data\SKSE\Plugins\hdtSkinnedMeshConfigs.
You can create a quick access to this directory in Explorer to access it quicker next time.

You can modify the configs.xml file while running the game :)
First you modify it (no need to do it in the virtual filesystem of MO2),
then you run the command 'smp reset' in the game console.

That way, you can quickly test your changes without restarting the game each time.

Configuring FSMP

FSMP is configured through the FSMP MCM or the configs.xml file found in the mod.

All of this is explained in the FSMP MCM, but some parts are better explained here, because I haven't the place to explain it in the MCM.

logLevel

logLevel: (int 0-5) level of logs

- 0 = kLevel_FatalError. Optimal performance.
- 1 = kLevel_Error
- 2 = kLevel_Warning
- 3 = kLevel_Message. Ideal to follow what happens when installing a new SMP mod.
- 4 = kLevel_VerboseMessage. Ideal to study performance.
- 5 = kLevel_DebugMessage. Necessary when reporting or diagnosing a bug.

enableNPCFaceParts

enableNPCFaceParts: (boolean (true or false)) enables physics for NPC face parts.

If no value is set, default is true.

disableSMPHairWhenWigEquipped

disableSMPHairWhenWigEquipped: (boolean (true or false)) if enabled, when you have at the same time smp hair and smp wig, now, only the wig is physically calculated.

More precisely, if you have an armor on the hair or longhair slot, no headpart is physically calculated.

You very probably want this, except if you use a hidden helmet mod.

If no value is set, default is false.

clampRotations

clampRotations: (boolean (true or false)) limits the PC rotation speed when turning a large angle, so that your character rotates slowly instead of instantly.

If no value is set, default is true.

rotationSpeedLimit

rotationSpeedLimit: (float) rotation speed limit of the PC in radians per second. Must be positive.

If no value is set, default is 10.0.

unclampedResets

unclampedResets: (boolean) when unclamped, if you do a large turn (full 180° for example), we will attempt to apply physics for that enormous turn. Setting this to true will instead trigger a physics reset on the actor if the turn is large enough. You can try setting this false and decide if you're OK with the results.

If no value is set, default is true.

autoAdjustMaxSkeletons

autoAdjustMaxSkeletons: (boolean) sets dynamically the maximum number of simultaneous skeletons/actors for which physics is calculated, between 1 and maximumActiveSkeletons (below) to consume only the allocated percentageOfFrameTime.

This can result in only one active skeleton when the load is heavy.

The algorithm will prioritize closer skeletons within the center of your field of view.

If disabled, fps may drop when you have too many active skeletons.

If no value is set, default is true.

maximumActiveSkeletons

maximumActiveSkeletons: (int) the configured maximum number of simultaneous skeletons/actors for which physics is calculated, when autoAdjustMaxSkeletons is enabled. If autoAdjustMaxSkeletons is disabled, the maximum simultaneously active skeletons number is 10 (hardcoded).

There is no limit on the value.

If no value is set, default is 20.

percentageOfFrameTime

percentageOfFrameTime: (int 1-100) [requires autoAdjustMaxSkeleton = true] percentage of the configured min-fps period allocated to additional physics calculus.

Each frame, FSMP uses a certain time to calculate physics (T).

Each frame, the work done by the Skyrim executable can be split into 2 parts:

- one that can be parallelized with the FSMP calculus (T1),
- one that can't because it depend on it (T2).

If the FSMP calculus T is shorter than T1, then physics doesn't cost any fps.

If it is longer, the Skyrim executable must wait (T - T1) for the physics calculus to finish.

This setting allows you to choose how much fps you're willing to lose to increase the number of skeletons with physics at the same time :)

FSMP being heavily parallelized, adding a 10th skeleton on top of 9 doesn't cost a lot, so you should do your tests with a reasonable number of skeletons (10?), and set this setting depending on what performance you want to have in a heavy context. Whiterun seems a good place.

Absolutely check what happens with the log at level 4 (verbose); it depends A LOT on your personal setup.

If your min-fps is 60 and your percentage is 30, then the allocated time for additional physics calculus during a frame is 1/60s * 30% = 5ms.

If no value is set, default is 30, which is NOT optimized.

sampleSize

sampleSize: (int) how many samples (sample taken every min_fps frames/every second) to determine the average ms per activeSkeleton.

This is used to log performance statistics and also used to calculate the processing time average used to limit the number of active skeletons.

Increasing the sample size will flatten outliers but can slow adjustment responsiveness.

The value must be equal or greater to 1.

If no value is set, default is 5.

disable1stPersonViewPhysics

disable1stPersonViewPhysics: (boolean) if set to true, the physics of the PC won't be calculated when in 1st person view, to save performance.

If no value is set, default is false.

enableCuda

enableCuda: (boolean) experimental GPU collision algorithm. Try this if you have a slow CPU and fast GPU. This setting will be ignored if you haven't installed the CUDA-enabled version.

If no value is set, default is false.

numIterations

numIterations: (int 4-128) could be simplified as 'simulation accuracy', lower values will gain performance at the cost of less quality.

If no value is set, default is 10.

groupIterations

groupIterations: (int 0-4096)

If no value is set, default is 2.

groupEnableMLCP

groupEnableMLCP: (boolean) Turns on the higher quality constraint solver, better constraint simulation at the cost of performance.

If no value is set, default is true.

erp

erp: (float]0-1[) The error correction force applied per simulation step, constraints will drift apart naturally, this value will exert a force to move them back to where they are supposed to be.

Do not use the 0 and 1 values.

If no value is set, default is 0.2.

min-fps

min-fps: (int 60-300), is the main frequency at which physics simulation will advance; in fact, it defines the main period of time at which the physics simulation will advance; (p=1/f).

min-fps should never be configured under 60, or the bullet physics engine would badly bug; thus it will be set it at 60 if you set it lower. The higher it is, the better your physics simulation will be and the more costly for your CPU/GPU. 120 costs twice as much cpu as 60.

If no value is set, default is 60.

In the current code is offered the possibility each frame to advance the simulation.

The accumulated time is defined as the time passed since last simulation.

The simulation advances if the accumulated time is greater than half of the tick, defined as the lower of the average frame period and the min-fps period.

The simulation advances then by accumulated time, limited to 'maxSubSteps' steps (by default 4), by steps of one tick, including one last step which can be lower than one tick.

The positives (compared to the ideal code) are (the information is given considering a min-fps set at 60):

- that code generates one simulation of one step each frame when you're at 60+ fps,
- that code allows a correct relation between the simulation time and the game time, ie no speedup or slowdown, as long as you're 15+ fps.

The negatives are:

- when under 15 fps, the simulation doesn't advance as fast as the game time, you'll experience slowdown of the physics-enabled elements;
- that code generates 2 simulations each frame when you're between 30-60fps, 3 simulations each frame when you're between 20-30 fps, and 4 simulations each time when you're between 15-20 fps. That means it is more costly when you're at low fps. An alternative would be not to advance the simulation, and experience slowdown between 20-30 fps, or between 20-60 fps;
- the last step of each simulation is never a fixed duration of time, it depends on the time spent since the last simulation. This NOT advised by bullet developers, and could introduce jiggling. However, it is better than jumping this step, which introduces very visible jittering.

maxSubSteps

maxSubSteps: (int, 1-60) this setting allows you to choose between fps and physics simulation quality, at low fps.

maxSubSteps is the maximum number of physics calculus steps, each frame.

Slowdowns are experienced when fps are below min-fps/maxSubSteps.

With the default value, slowdowns are experienced below 60/4 = 15 fps.

The higher it is, the more costly your physics simulation will be at low fps. 2 substeps cost twice as 1 substep.

When fps are above min-fps, one substep is enough; when fps are between min-fps/n and min-fps/(n+1), n+1 substeps are necessary.

The max value is 60, which allows for slowdowns below 5 fps when min-fps is at 300 (max value).

If no value is set, default is 4.

enabled

enabled: (bool) Whether to enable wind effects, default is true.

Wind in Skyrim is not developed well and appears to be a static direction.

Wind can be detected generally from the sky object or by a weather object.

Wind can be tested when snow or rain is falling (e.g., SkyrimStormSnow)

windStrength

windStrength: (float) Base strength of wind. Compare to gravity which uses 9.8 m/s^2, default is 2.0.

distanceForNoWind

distanceForNoWind: (float) How close to an obstruction for wind to be fully blocked.

This scales linearly with distanceForMaxWind. default is 50.0.

distanceForMaxWind

distanceForMaxWind: (float) How far from an obstruction for wind to be not blocked.

This scales linearly with distanceForNoWind. default is 3000.0.

Configuring BHUNP

If you use BHUNP, configure it with its MCM, and especially the “CBPC Physics Toggles” which stops CBPC for certain parts of the body if you use SMP for them.

If you don’t, you’ll have jitters, trembling, of these body parts!

Solving problems

Where to find help?

If you have a problem to solve

- Read this guide!
- On the FSMP Nexus forums: https://www.nexusmods.com/skyrimspecialedition/mods/57339?tab=forum Do I personally answer there? It happens, but no guarantee; lots of other people do, though.
- On the FSMP Discord server: https://discord.gg/tvWRzcKPV3 Do I personally answer there? It happens more often.
- On Github bug report: (see How to do a bug report) Do I personally answer there? If you do a good bug report for a real FSMP bug or a good feature request, chances are quite high.

Do not:

- Request help directly from me by PM.
- Report a bug without all the requested information.

Honestly, lots of people are quite more knowledgeable than me on the subject of SMP. I'm more of an optimizer than a user myself.

If you want to propose code

Contact me (DaydreamingDay) on the FSMP Discord (invite above), or do a Push Request on my github repository: https://github.com/DaymareOn/hdtSMP64

If you want to propose your help

Contact me (DaydreamingDay) on the FSMP Discord (invite above).

External resources

Treota guide:
https://forums.nexusmods.com/index.php?/topic/3800385-a-guide-to-hdt-smp-usersmodders

I GOT A PROBLEM...

- Set your logs at level 5 (see Configuring FSMP)
- Look at the logs in here: C:\Users\{you windows user name}\Documents\My Games\Skyrim Special Edition\SKSE
- Do you have an error about hdtSMP64 in skse64.log?
- In hdtSMP64.log?

How to do a bug report?

Please don't report a CTD without a crash log from Alandtse Crashlogger, with the correct pdb installed too (see Requirements).

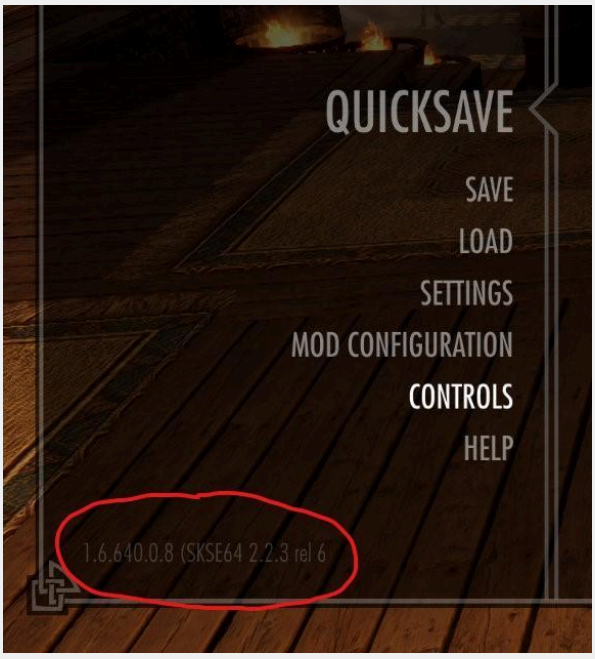
Please set your log level at level 5 (see Configuring FSMP), then reproduce your bug.

Please go here and report your bug: https://github.com/DaymareOn/hdtSMP64/issues/new/choose

Keep in mind that if you don't provide the requested information, I won't be able to work on your bug report; especially:

- the Skyrim version and the SKSE version,
- the FSMP version,
- the hdtSMP64 log,
- the skse64 log,
- the possible crash log.

Please provide a screenshot like this one below, so that we're sure of the versions of what's running:



The logs are in C:\Users\{you windows user name}\Documents\My Games\Skyrim Special Edition\SKSE

Please keep in mind too that there is more than 900 thousands users and only one me, and that every time you force me to ask you for something that you could have given to me directly without me having to request it from you, you make me lose time from my limited free time that I could have used to advance FSMP instead. Or play with my daughter.

Don't ignore this, this is one of the main reasons why mod authors don't do support to final users.

CTDs

Please don't report a CTD without a crash log from Alandtse Crashlogger, with the correct skyrim pdb installed too (see requirements).

FSMP is working every frame, so it will be visible in most crash logs, even when it's not related to the crash.

If the first reference of FSMP in the callstack in the crashlog mentions the function "onFrame@UnkEngine", and there are at least one other line before in the callstack, then the crash is very possibly not related to FSMP.

Usual bugs

Jitters, trembling

If you use BHUNP, check that you configured the CBPC Physics Toggles (see Configuring BHUNP).

Invisibility

Most invisibility bugs were on AE, and were solved with FSMP 1.50.4. However, a specific bug related to Skyrim itself has been noted. Here it is explained.

This information is 99% based on jg1 work, endorse him, give him kudos :)

The probable errors are mine.

This bug here isn't caused by FSMP, it's a native bug.

FSMP allows to check it through its logs.

Some say that they don't have the problem when FSMP is disabled, I had a current 1.6.640 save where this problem happens even when FSMP is disabled.

The root of the problem

Hairstyles usually have "extra parts", which in SMP are often used to attach collision objects. In this case, they are invisible and just used for logic. When you browse in the racemenu between hairstyles that use the same extra part, this part may become duplicated, which is a native game bug. For whatever reason, this duplication is what causes the invisibility.

So it's a save-file local problem: either you have such a duplicated head part on your character, or you do not. If you do, your save is bugged and you will disappear whenever you block the camera. If you don't, you'll never have this problem.

Curiously enough, the disappearing only seems to happen in outdoors locations in SE, it happens indoors too in AE; and the extra headparts stay on you wherever you go.

You don't even need any mod-added styles. There are a few vanilla beards that will trigger this bug, but you have to switch between very specific ones that are not adjacent in the list (the two "goatee-in-a-knot", for example).

To test if your save is bugged:

Go to any wilderness location. Save and reload your game. Zoom in close in 3rd person view and look straight up (should trigger fade-out). If you disappear, your save is bugged. Else, it's ok.

Alternatively, you can look in hdtSMP64.log to see if there is a duplicated headpart on your character. In this (bugged) example, "VirtualHead" is duplicated:

hdtSMP64 2.0

SkinAllGeometry skeleton_female.nif 7, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualHead, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleHeadNord, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleEyesHumanHazel, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - KSSMP_Sky022, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - KSSMP_Sky022_HL, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualGround, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualHairCollision_2, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualHead, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleBrowsHuman16, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

To fix a bugged save:

Open the racemenu by console. Switch to a vanilla headpart (hair, beard, vampire face, eyebrows, eye colour, …, let’s say it’s hair thereafter), then switch back to whatever you were using. Close the racemenu and your save is fixed forever.

You MUST NOT BROWSE between hairstyles when switching back. Go DIRECTLY to the one you want to use. The "undo" function of ECE makes this easy: Just select a vanilla hairstyle and hit undo, that's it.

You can save the preset with the desired SMP hair too, then choose the preset later instead of browsing hairs.

If changing hair doesn't help, you could try the same procedure with another headpart as well.

Here's the example log file from above, after the fix. The extra "VirtualHead" is gone:

hdtSMP64 2.0

SkinAllGeometry skeleton_female.nif 7, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleMouthHumanoidDefault, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleHeadNord, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleEyesHumanHazel, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - KSSMP_Sky022, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - KSSMP_Sky022_HL, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualGround, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualHairCollision_2, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - VirtualHead, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

SkinSingleGeometry skeleton_female.nif 7 - FemaleBrowsHuman16, TestChar, (formid 00000014 base form 00000007 head template form 00000000)

Advanced

Console commands

smp
Prints some basic information about the number of tracked and active objects.

smp on, smp off
Starts/pauses the physics calculus.

smp reset
Reloads the configs.xml file, attempts to reload all meshes and reset the whole HDT-SMP system. However, it is a little buggy and may fail to reload some meshes or constraints properly.

smp dumptree
Dumps the entire node tree of the current targeted NPC to the log file.

smp detail
Shows extended details of all tracked actors, including active and inactive armors and head parts.

The state of each actor is given, it is among these values:

- Not in scene: the default state
- Is player character: self-explaining, isn't it? The physics is calculated.
- Unseen by player: requires the actor to have physics, the actor is obstructed from the view of the PC: the physics isn't calculated.
- Is near player: requires the actor to have physics, the physics is calculated.
- Deactivated for performance: requires the actor to have physics. The actors are ordered depending on their distance from the camera and their angle with the camera axis; a number, depending on the performance configuration, of the first actors in this list are calculated, the others are deactivated for performance.

smp list
Shows a more concise list of tracked actors.

smp gpu
(For the cuda version only) Toggles the CUDA collision algorithm, if there is at least one CUDA device available. If there is no device available, it does nothing.

smp timing
(For the cuda version only) Starts a timing sequence for the collision detection algorithm. The next 200 frames will switch between CPU and GPU collision. Once complete, mean and standard deviation of timings for the two collision algorithms are displayed on the console.

smp QueryOverride
Prints DynamicHDT existing override data: for each actor, the original file and the overriding file.

About CUDA

CUDA support is enabled by default, but will only work on the CUDA versions. CUDA versions with CUDA disabled in the configs.xml is absolutely not supported.

CUDA version do not check the capabilities of your GPU, so it may crash if your card is too old. Do not ask how old, just test, it will be way quicker.

The absolute minimum required compute capability is CUDA 3.5, to support dynamic parallelism.

The following parts of the collision algortihm are currently GPU accelerated:

- Vertex position calculations for skinned mesh bodies
- Collider bounding box calculations for per-vertex and per-triangle shapes
- Aggregate bounding box calculation for internal nodes of collider trees
- Building collider lists for the final collision check
- Sphere-sphere and sphere-triangle collision checks
- Merging collision results (note that this may reduce performance for objects with lots of bones, as the merge buffer can get quite big - still working on this!)

The following parts are still CPU-based:

- Converting collision results to manifolds for the Bullet library to work with
- And, of course, the solver itself, which is part of the Bullet library, not the HDT-SMP plugin

This is still experimental, and may not give good performance. The old CPU collision algorithm was heavily optimized, so matching its framerate is not easy. You will need a high end GPU and a low end CPU to see any real performance benefits.

How to compile your own FSMP

If you wish to compile yourself, here is a compilation guide for SSE/AE/VR.

Why?

Excepted if you'd wish to develop your own evolutions, why would you want to do this?

Because you want to build a version specific to your GPU generation, it might save you some FPS. I already build 5 (skyrim versions) x 4 (AVX versions) x 2 (cuda or not) x 2 (release and debug) = 80 versions, I'm not able to multiply this by a dozen of GPU generations. Personally I build my own version for 2080 TI :P

I know of no other reason. If you find one, please tell me.

How?

You will need to download and install:

- Visual Studio 2019 or 2022 (I use now 2022) (any edition, the free community edition is ok)
- Git
- CMake
- .NET Framework 4.8 Developer Pack too
- 8.1 SDK, not provided with VS2019: https://go.microsoft.com/fwlink/p/?LinkId=323507
- Visual build tools 2015 update 3: https://my.visualstudio.com/Downloads?q=visual%20studio%202015&wt.mc_id=o~msft~vscom~older-downloads, take the dvd version and install it

Open a VS2019/VS2022 command prompt (just push the windows key, and begin to type "x64 Native Tools Command Prompt for VS2019" (or 2022)).

Download and build Detours:

The directory we will work in is called C:\Games\Faster HDT-SMP, you can call it as you wish. Do not put it in Program Files.

You can choose another one, but you will have more config steps.

The included bullet code was the same version as aers used when compiling, 2.89, and not the latest 3.00+, where how physics is handled may have been changed.

This has changed since 1.49.0, we now use bullet 3.24. This allowed for multi-threaded calls to bullet.

```
cd C:\
mkdir Games
cd Games
mkdir "Faster HDT-SMP"
cd "Faster HDT-SMP"
git clone https://github.com/microsoft/Detours.git
cd Detours
nmake
```

- For the Special Edition, download skse64_2_00_20.7z from https://skse.silverlock.org and unpack into C:\Games\Faster HDT-SMP\ (source code is included in the official distribution).
- For the Steam Anniversary Edition, take the last preliminary AE build (currently 2_02_06). (NB: This guide hasn't been updated for the specific 2_02_03 version).
- For the GOG Anniversary Edition, take the GOG build (currently 2_02_06). (NB: This guide hasn't been updated for the specific 2_02_03 version).
- For the VR edition, take the last VR build (currently 2_00_12).

Get the HDT-SMP source:

```
cd C:\Games\"Faster HDT-SMP"\skse64_2_00_20\src\skse64
git init
git remote add origin https://github.com/DaymareOn/hdtSMP64/
git fetch
git checkout master
```

For VR, "skse64" is replaced by "sksevr", this is true for following instructions too.

NB: in the 2_02_06_gog version, there is no ‘skse64’ and ‘common’ folders!

```
The arborescence must be like this:
skse64_2_00_20\
skse64_2_00_20\Data
skse64_2_00_20\src
skse64_2_00_20\src\common (and not common\common)
skse64_2_00_20\src\skse64
```

So:

- Create the move the content of src in a newly created src\skse64 folder
- Copy the 'common' folder that is present in the steam 2_02_06 skse archive (\skse64_2_02_06\src\common\common) in the \skse64_2_02_06_gog\ folder.

Change the folders so that src/common/common becomes src/common. No need to do this for VR.

Open C:\Games\Faster HDT-SMP\skse64_2_00_20\src\skse64\hdtSMP64.sln in Visual Studio.

When asked to retarget projects, retarget to the latest, with update to 142 (or 143 if on VS2022).

Make the following changes to the SKSE code:

In NiObjects.h, at line 81 for SE/VR (79 for AE), delete:

```
virtual void* Unk_05(void);
```

and replace it with:

```
virtual BSFadeNode* GetAsBSFadeNode(void);
```

At line 88 for SE/VR (86 for AE), delete:

```
virtual void* Unk_0C(void);
```

and replace it with:

```
virtual BSDynamicTriShape* GetAsBSDynamicTriShape(void);
```

In the same file, at line 36 for SE/VR (34 for AE) (the end of the list of class declarations), add:

```
class BSDynamicTriShape;

class BSFadeNode;
```

And at line 174 for SE/VR (172 for AE) (inside the enum definition), add:

```
kNone =0,
```

In GameEvents.h, at line 667 for SE/AE, 605 for VR, delete:

```
EventDispatcher<void>unk840;//  840 - sink offset 0C8
```

and replace it with:

```
EventDispatcher<TESMoveAttachDetachEvent>unk840;//  840 - sink offset 0C8
```

In GameMenus.h, before line 1105 for SE, 1056 for VR, 1098 for AE (just before the GetSingleton declaration), add:

```
bool IsGamePaused() { return numPauseGame > 0; }
```

In GameData.h, comment out the block of static asserts line 167 (159, 726 and 881 in VR; 171, 172, 173 for AE; same + 720, 875 for 1.6.659).

In skse_version.h line 63, at least for 1.6.1179, replace the line by:

```
#define CURRENT_RELEASE_RUNTIME                RUNTIME_VERSION_1_6_1179_GOG
```

For 2.2.4, 2.2.5, (2.2.6 ?) in NiRTTI.cpp, replace the content of the file with the content at this address:

https://raw.githubusercontent.com/ianpatt/skse64/master/skse64/NiRTTI.cpp

Close Visual Studio.

For SKSE64 2.1.5 (errors in the provided source code):

- open skse64.sln with a text editor, look for "common\common" and replace it by "common".

For SKSE64 2.2.2, 2.2.4, 2.2.5 and 2.2.6, do this for

- skse64/skse64.vcxproj,
- skse64_common/skse64_common.vcxproj,
- skse64_loader_common/skse64_loader_common.vcxproj,
- skse64_steam_loader/skse64_steam_loader.vcxproj too.

- open sheets/Runtime.props: look for such a line, and replace the code by the one here:

```
<PreprocessorDefinitions>RUNTIME_VERSION=0x01061610;%(PreprocessorDefinitions)</PreprocessorDefinitions>
```

The number must be:

- 0x01050610 for 1.5.97
- 0x01061610 for 1.6.353
- 0x01062800 for 1.6.640
- 0x01062930 for 1.6.659
- 0x010646A0 for 1.6.1130

- 0x01064920 for 1.6.1170
- 0x010649B0 for 1.6.1179

Open C:\Games\Faster HDT-SMP\skse64_2_00_20\src\skse64\skse64.sln in Visual Studio.

Do not retarget. (For VR, retarget to v142).

Select Release and x64.

Open the properties for the different projects (Alt+F7), and for those with an Post-build event (skse64, skse64_loader, skse64_steam_loader), disable it by setting Yes to No.

Then generate the solution.

For AE, ignore the errors concerning the projects with "loader" in their name.

Close Visual Studio.

Reopen the hdtSMP64.sln file.

Open properties (Alt+F7 when the project is selected in the left panel) for the skse64 project.

Select all configurations.

Select General, and change Configuration Type from "Dynamic Library (.dll)" to "Static Library (.lib)".

Depending on your edition, CPU and GPU, select your configuration (ex: AE_CUDA_AVX), x64.

If you choose a CUDA version, and wish max performance, you can configure the CUDA build for your own GPU: in hdtSMP64 properties, CUDA C/C++ -> Device -> Code Generation: only keep the "compute_XX,sm_XX;" which corresponds to your GPU architecture (https://docs.nvidia.com/cuda/cuda-compiler-driver-nvcc/index.html#gpu-feature-list).

Then 'F7'.

Postliminaries

Contact

DO NOT contact me for support by DM, whether on Nexus, Discord or Github.

DO NOT think I will read the forums (too many people, too much to read, too low signal/noise ratio).

For other reasons: you can contact me on the Nexus by DM, on Discord. It's no problem at all to ping me on Discord.

Here is a FSMP Discord server invite: https://discord.gg/tvWRzcKPV3

I have a Ko-fi and a patreon, the link is available on the FSMP Nexus description page.

Congratulations

To have read until there 😊 !