$$\sqrt{\alpha+\gamma\,(-1+\epsilon)^2+(-2+\epsilon)\,\epsilon}+\sqrt{\alpha+\gamma\,(1+\epsilon)^2-\epsilon\,(2+\epsilon)}<2\sqrt{\alpha+\gamma}$$

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```
S1 = Sqrt[α + γ (-1 + ε)^2 + (-2 + ε) ε];
S2 = Sqrt[α + γ (1 + ε)^2 - ε (2 + ε)];
S3 = 2 Sqrt[α + γ];
Expand[(S1 + S2)^2] ≥ S3^2
```

$$2\alpha+2\gamma-4\epsilon+2\gamma\epsilon^2+2\sqrt{\alpha+\gamma\,(-1+\epsilon)^2+(-2+\epsilon)\,\epsilon}\,\sqrt{\alpha+\gamma\,(1+\epsilon)^2-\epsilon\,(2+\epsilon)}\geq 4\,(\alpha+\gamma)$$

```
Simplify[%]
```

$$\gamma\epsilon^2+\sqrt{\alpha+\gamma\,(-1+\epsilon)^2+(-2+\epsilon)\,\epsilon}\,\sqrt{\alpha+\gamma\,(1+\epsilon)^2-\epsilon\,(2+\epsilon)}\geq\alpha+\gamma+2\epsilon$$

```
LHS = Sqrt[α + γ (-1 + ε)^2 + (-2 + ε) ε] Sqrt[α + γ (1 + ε)^2 - ε (2 + ε)];
RHS = α + γ + 2 ε - γ ε^2;
Expand[LHS^2 ≥ RHS^2]
```

$$(\alpha+\gamma\,(-1+\epsilon)^2+(-2+\epsilon)\,\epsilon)\,(\alpha+\gamma\,(1+\epsilon)^2-\epsilon\,(2+\epsilon))\geq(\alpha+\gamma+2\epsilon-\gamma\epsilon^2)^2$$

```
Simplify[%]
```

$$\epsilon\,(\epsilon^3+\alpha\,(8-4\,\gamma\,\epsilon)-4\,\gamma\,(-2+\epsilon^2))\leq 0$$

```
In[27]:= NotebookPrint[SelectedNotebook[],
           "/home/fdahl/writing/lis/notebooks/sqrt inequality.nb.ps"]
```